the state of food and agriculture 1971

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

THE STATE OF FOOD AND AGRICULTURE
SPECIAL CHAPTERS

In addition to the usual review of the recent world food and agriculture situation, each issue of this report from 1957 has included one or more special studies of problems of longer term interest. Special chapters in earlier issues have covered the following subjects:

1957	Factors influencing the trend of food consumption
	Postwar changes in some institutional factors affecting agriculture
1958	Food and agricultural developments in Africa south of the Sahara
	The growth of forest industries and their impact on the world's forests
1959	Agricultural incomes and levels of living in countries at different stages of economic development
	Some general problems of agricultural development in less developed countries in the light of postwar experience
1960	Programing for agricultural development
1961	Land reform and institutional change
	Agricultural extension, education and research in Africa, Asia and Latin America
1962	The role of forest industries in the attack on economic underdevelopment
	The livestock industry in less developed countries
1963	Basic factors affecting the growth of productivity in agriculture
	Fertilizer use: spearhead of agricultural development
1964	Protein nutrition: needs and prospects
	Synthetics and their effects on international trade
1966	Agriculture and industrialization
	Rice in the world food economy
1967	Incentives and disincentives for farmers in developing countries
	The management of fishery resources
1968	Raising agricultural productivity in developing countries through technological improvement
	Improved storage and its contribution to world food supplies
1969	Agricultural marketing improvement programmes: some lessons from recent experience
	Modernization of institutions to promote development
1970	Agriculture at the threshold of the Second Development Decade

THE STATE OF FOOD AND AGRICULTURE 1971

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WORLD REVIEW

REVIEW BY REGIONS

WATER POLLUTION AND ITS EFFECTS ON LIVING AQUATIC RESOURCES AND FISHERIES

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome, 1971

The statistical material in this publication has been prepared from the information available to FAO up to 1 October 1971

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal or constitutional status of any country, territory or sea area, or concerning the delimitation of frontiers.

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NOTE

The following symbols are used in statistical tables:

— none or negligible

... not available

1967/68 signifies a crop, marketing or fiscal year running from one calendar year to the next. 1967-68 signifies the average for two calendar years. In the Annex tables an average of split years, for example 1948/49-1950/51, is indicated as follows: 1948/-50/.

Figures in statistical tables may not add up because of rounding. Percent changes from one year to another have been calculated from unrounded figures.

Unless otherwise indicated, the metric system is used throughout. For explanation of the coverage and methods of calculating the FAO index numbers of agricultural production and international trade in agricultural products, see Explanatory Note to the Annex Tables.

FOREWORD

A reassuring feature among the developments in world agriculture in 1970 was the continued progress of rice and wheat production in the Far East, the world's most concentrated food deficit zone, as steadily increasing use was made of improved seed varieties. Total food production in that region again rose at a rate comfortably ahead of the population growth, and governments are taking measures to spread the new technology over still larger areas and to bring it to farmers who thus far have not been able to profit by it.

In other developing regions progress was also made in a number of countries. But a greater number failed to raise their food production fast enough to supply their growing populations with more and better food from their own output. There was little or no increase in the total food production of the developing countries of Africa and the Near East, so that in per caput terms their food production fell. In Latin America output grew more, but even there it was just sufficient to keep pace with population growth. Nor was 1970 an exceptional year. Over the entire decade of the 1960s the trend of food production per head showed virtually no increase in any of the developing regions, and actually fell somewhat in Africa.

It might be said that, given the very high rates of population growth in the developing regions, there is some comfort in the fact that they have at least been able to maintain the level of their per caput food production. But this is not good enough. The FAO Indicative World Plan for Agricultural Development and the strategy for the Second Development Decade postulate an increase in per caput food consumption that requires a sustained increase in food production at the rate of some 4 percent a year, and a much more rapid one in the case of preferred and nutritious foods, particularly livestock products. Failure to achieve this acceleration in production will mean that large numbers of people will be condemned to continue on substandard diets, that agriculture will be a general drag on economic growth, and that the already acute social tensions in many developing countries will be aggravated. It is to avoid this that a widespread introduction of improved agricultural technology — a real "green revolution" — is required in the developing world as a whole.

Many people speak of the green revolution as if it were already an accomplished fact. But some caution is called for if we are not to be carried away by mere slogans and catchwords. For, taken literally, the phrase would seem to imply a general, radical and permanent improvement in the agricultural situation in the developing countries. This would require not only a new approach by the farmer with regard to his crops and livestock, but also new approaches in processing, marketing, and industries supporting agriculture. The overall aims would be to bring about a substantial and permanent improvement in the level and quality of diets, higher farm incomes, and an agricultural sector which played its full part in the national development process.

That the new technology now applied to rice and wheat cultivation in a number of countries has already brought about real benefits cannot be doubted. It has enabled cereal imports to be cut in several countries. More ample stocks are being built and the per caput consumption of wheat and rice has increased. Even more important, many farmers have in effect received a technological education that will also help them to grow other crops better. Moreover, the world has been shown that, given the right policies and sufficient efforts, farmers in developing countries are capable of mastering more advanced technological methods.

But this is not yet a green revolution. Even in the most successful countries, mainly in the Far East, the increases in wheat and rice yields and output have not been matched by similar increases in the production of other foods. And in other regions intensive yield-raising

programmes, with a few significant exceptions, are only at a very early stage, if they have been started at all. Perhaps the most telling indication of the precariousness of the food supply situation in much of the developing world is the large number of requests that FAO receives for emergency food relief, particularly from African countries. It is true that emergencies can always arise because of the fickleness of the weather. But many countries are still unable to cope even with what must be considered normal fluctuations in output.

This does not mean that all countries can or need put an equal emphasis on food production. The food strategy chosen will depend on a variety of considerations. These include the present and prospective level and pattern of domestic and export demand; the amount and nature of the country's endowment in agricultural resources in comparison with that of other sectors; its capacity to import food; population pressures; and the extent to which alternative employment opportunities can be made available. Neither FAO nor any other international institution can tell any government what portion of its resources it should use for food production. However, FAO can help countries in several ways. It can, if they so wish, assist them in planning their food policies in a conscious and integrated way, taking account of all relevant technical, economic and social factors within the context of local circumstances and national aspirations. It can assist them to plan and implement specific programmes for improving technology and for increasing the output of crops, livestock, fisheries, and forest products, as it is already doing in many of these countries. It can also encourage research.

The increasing importance of research has been widely recognized, and FAO has recently taken some important initiatives to widen and deepen its application to agriculture in developing countries. Jointly with the International Bank for Reconstruction and Development and the United Nations Development Programme, we have sponsored a new Consultative Group on International Agricultural Research, in which other agencies are participating. The Consultative Group aims at identifying major gaps in agricultural research and at encouraging and financing appropriate research activities to fill them. FAO has also initiated efforts to coordinate agricultural research activities in the various ecological zones of Africa, with a view to making the best possible use of the necessarily limited research staff and facilities available, and is playing a major role in promoting rice research in west Africa through the West African Rice Development Association. By these means we hope to help maintain or accelerate the recently-achieved momentum in technological progress and to encourage its application, so successful in the case of rice and wheat, to other food crops.

What has been said above mainly concerns the developing countries. In the developed market economy countries, the picture is very different: a virtually stable level of production, surplus problems for a number of major commodities, widespread dissatisfaction among farm populations, and accusations of dumping, unfair trade practices and excessive protectionism.

Thanks to a largely planned reduction in output of some major products, particularly wheat, butter and skim milk, as well as an unexpected fall in maize, some progress was made toward a better balance in world markets for agricultural commodities. Butter markets in fact have changed to such an extent that they are now characterized by shortages rather than surpluses. But stocks of wheat and rice remain excessive, and large amounts of fruit have had to be destroyed in Europe. And such improvements as have been achieved were purchased at a heavy cost, in both money and social tensions.

The effects of all these changes in production and trade should have brought home very clearly the fact of the interdependence of the agricultural sectors of various countries. In the last few years we have seen the welfare of the New Zealand dairy farmer affected by the milk price decisions of European governments; the income of the rice farmer in Thailand reduced by the self-sufficiency programmes of other Far Eastern countries and the structural problems of agriculture in Japan; and the production decisions of the prairie farmers in Canada changed by technological progress and agricultural protectionism in distant countries.

The producing countries have, by force of circumstances, adjusted themselves to the changes. In some cases the adjustments have been drastic, as in Canada where wheat

production in 1970 was cut by half, or in the United Arab Republic where rice export earnings decreased by two fifths. But farmers and governments should not be obliged to make such drastic and sudden adjustments. Even if exact forecasts are impossible, if only because of the uncertainties of the weather, it should at least be possible to know in broad terms the direction in which adjustments are likely to be needed, and thus prepare for them in such a way that they can be executed in orderly fashion. For unplanned and drastic adjustments are wasteful. They leave in their wake feelings of uncertainty and bitterness which make the application of rational policies all the more difficult. And if adjustments are not made in production and trade patterns which reflect superseded comparative advantages and outmoded national aspirations, the entire process of economic and social development, in rich and poor countries alike, will suffer.

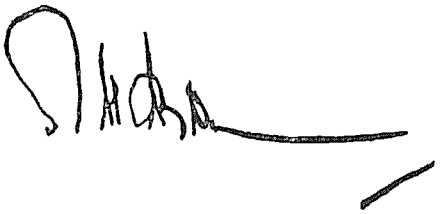
It is for these reasons that I have recently placed much stress on the need for what I call " international adjustment " in agriculture. In a statement to the twenty-fifth anniversary session of the International Federation of Agricultural Producers I said that there was a need to recognize " the fact that the completely unbalanced state of world agriculture... would, if allowed to persist, slow down world development and might even provoke intensified trade war and destroy patterns of cooperation built up so painfully since 1947. Recognition of this fact — and a determination to do something about it — involves acceptance of another inescapable conclusion, which is less easily palatable. This is the fact that, in the world of today, agricultural policies can no longer be formulated in an exclusively national or even regional or subregional context." This is also the reason why I have proposed that international adjustment should be the principal theme of the seventeenth session of the FAO Conference which will be held in November 1973. I am fully aware of the complexity of the issues involved and of the sovereign role of governments in bringing about the adjustments needed. I am convinced, however, that FAO, as the organization entrusted with international responsibility with regard to agricultural development, is uniquely fitted to provide a forum for a review of world agricultural production and trade and is thus best placed to assist governments in seeking the adjustments that are needed in an international perspective. Adjustments toward more rational patterns of production will undoubtedly involve short-term costs. Against these, however, must be set the long-term costs which will have to be paid if irrational, uneconomic and unbalanced patterns of output and exchange are allowed to continue.

Decisions on changes in the intensity and location of agricultural production will mean that increasing attention will have to be paid in the coming years also to the related effects on the environment. The entire problem of environmental deterioration and means of combating it is, in fact, the subject of a major United Nations conference to be held in Stockholm in 1972. FAO, as the United Nations agency responsible for the conservation of living natural resources, is actively participating in the preparations for this conference. It is fitting, therefore, that the special chapter in this year's report should deal with a major aspect of the environmental problem, namely the pollution of the world's rivers, lakes and seas, and its effects on aquatic living resources and on fishery and its products. This is a problem of increasing concern to all countries, both industrialized and developing.

This year's study is predominantly technical in nature. Pollution and environmental protection have their important economic aspects, but as an essential prerequisite for formulating a broad strategy for tackling these problems seriously, their technical and scientific aspects must be brought to public knowledge. The study also deals with both technical and legislative means by which the process of deterioration of the fresh waters and oceans can be prevented, reduced and, where possible, reversed. Furthermore, it demonstrates the possibilities for the constructive use of some pollutants, for instance the utilization of thermal effluents and nutrient-rich wastes for aquaculture, which is expected to develop considerably during the coming years and to contribute substantially to the production of animal protein.

It must become generally recognized and accepted that man has a responsibility to prevent natural resources and values from irreversible damages or depletion. On the other hand, it is also clear that technological development cannot be arrested in order to preserve the environment. We believe that by using an ecological approach it is possible to promote agricultural and industrial development without unduly affecting the quality of the

environment. FAO is particularly concerned with the problem because of its dual role of promoting development and at the same time attending to the management of the environment and its renewable resources. There are risks of incompatibility between these two responsibilities, especially when promoting technical assistance. Developing countries need to improve their capabilities as rapidly as possible, but it is important that they be spared the mistakes made by countries which industrialized earlier. It would be irrational to suggest that industrial development in these countries be checked because they often lack the means to cope with harmful side-effects. Rather, it must be the responsibility of the developed nations, the scientific community and the international organizations to assist developing countries toward development without destruction of the environment. It is my hope that the study will help to alert governments and the general public to the growing seriousness of the environmental problem and to the need to tackle it nationally and through joint action among countries.



A.H. BOERMA
Director-General

Chapter I. - WORLD REVIEW

Agricultural production

The world[1] agricultural production picture in 1970 was again highlighted by continued growth in the developing countries as a whole and a standstill in the developed market economies. However, in only one developing region — the Far East — was the increase in food production sufficient to raise significantly the level of output per head. Also over the somewhat longer term the Far East is the only developing region to show any overall increase in per caput food production. In other developing regions the trend since 1967 has been stable or falling.

The preliminary index of world agricultural production was up by 2 percent.[2] Fishery production, the growth of which had slowed down in 1969, again accelerated in 1970, but since most of the increase was in fish not used for food the direct impact on the nutritional situation was somewhat limited. Forest production is estimated to have continued to expand at a relatively slow rate (Table I-1).

The changes in output by regions and countries are examined in greater detail in Chapter II. The stationary level of production in the developed market economy regions resulted mainly from policies designed to reduce surplus stocks of wheat, dairy products and rice, but output was also affected by bad weather in some areas. Particularly drastic cuts were made in wheat production in Australia and Canada. The 6 percent increase in the combined index for eastern Europe and the U.S.S.R. reflects mainly the steep recovery in output in the latter country, particularly of cereals.

In the developing Far East, total agricultural production and the production of foodstuffs are preliminarily estimated to have both risen by 4 percent (Table I-2). Also in Latin America production increased considerably, particularly if only food products are considered, but much of the latter reflected the remarkable increase in Cuba's sugar production, which is mainly for export. In the rest of the region combined, food production increased by 3 percent, or roughly in line with population growth. For the developing countries of Africa the preliminary indices show only a very small overall increase, although there was a considerable but still incomplete recovery of production in the Maghreb coun-

[1] Excluding mainland China and other Asian centrally planned countries.
[2] The preliminary indices tend, however, to underestimate somewhat the level of output.

TABLE I-1. – INDICES OF WORLD[1] PRODUCTION OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1948-52 average	1953-57 average	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (preliminary)	Change 1969 to 1970
	1952-56 average = 100													*Percent*
TOTAL PRODUCTION	...	103	119	121	125	128	131	133	138	142	147	148	151	+ 2
Agriculture	87	103	119	121	126	128	132	133	138	143	148	148	151	+ 2
Fishery	86	103	121	127	135	138	147	155	163	171	177	181	192	+ 6
Forestry	...	102	112	111	113	115	121	122	123	126	128	130	131	+ 1
POPULATION	93	102	112	115	117	119	122	124	127	129	132	134	137	+ 2
PER CAPUT TOTAL PRODUCTION	...	101	106	105	107	107	108	107	109	110	111	110	110	—
Agriculture	93	101	106	106	108	108	108	107	109	111	112	110	110	—
Fishery	92	102	107	111	116	115	121	125	129	133	134	135	140	+ 4
Forestry	...	100	100	97	97	97	99	98	98	97	97	97	96	— 1

NOTE: For details of the methodology and coverage of these indices, see the explanatory note to the Annex tables.
[1] Excluding mainland China.

TABLE I-2. – INDICES OF WORLD [1] AND REGIONAL AGRICULTURAL PRODUCTION IN RELATION TO POPULATION

	1948-52 average	1953-57 average	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (preliminary)	Change 1969 to 1970
	1952-56 average = 100													*Percent*
Total production														
ALL AGRICULTURAL PRODUCTS														
Western Europe	84	103	118	118	125	127	129	130	133	141	145	145	145	—
North America	93	100	109	109	112	119	117	119	120	124	126	125	124	—
Oceania	89	101	122	125	133	137	141	135	152	143	167	164	162	— 1
Other developed market economies [2]	81	104	121	125	133	134	136	137	143	165	166	167	167	—
DEVELOPED MARKET ECONOMIES	89	101	114	114	119	124	124	125	128	133	137	136	136	—
Latin America	87	103	120	128	128	132	134	143	140	148	147	153	158	+ 3
Far East [3]	87	103	121	127	128	132	136	134	135	141	148	155	160	+ 4
Near East [4]	82	104	124	123	135	137	141	145	148	153	159	163	163	— 1
Africa [5]	85	102	121	116	124	128	132	134	134	138	142	147	148	+ 1
DEVELOPING MARKET ECONOMIES	86	103	121	125	129	132	135	138	138	144	148	154	158	+ 3
Eastern Europe and U.S.S.R.	82	105	132	135	138	133	145	148	165	166	173	168	178	+ 6
World [1]	87	103	119	121	126	128	132	133	138	143	148	148	151	+ 2
FOOD PRODUCTS ONLY														
Western Europe	84	103	118	118	126	127	129	130	134	142	146	146	147	—
North America	92	100	111	110	114	121	120	122	127	132	133	132	130	— 1
Oceania	92	100	121	124	135	138	144	136	159	145	175	167	166	— 1
Other developed market economies [2]	81	104	123	127	137	136	138	139	146	171	171	172	174	+ 1
DEVELOPED MARKET ECONOMIES	89	101	115	115	120	125	125	127	132	138	142	141	141	—
Latin America	87	103	117	124	126	131	137	141	142	151	152	157	166	+ 5
Far East [3]	87	103	123	127	129	132	137	134	135	141	149	156	162	+ 4
Near East [4]	82	104	122	123	133	135	137	141	145	150	155	159	159	—
Africa [5]	86	102	117	113	121	125	127	128	128	132	137	140	141	+ 1
DEVELOPING MARKET ECONOMIES	86	103	120	124	127	131	135	136	137	143	149	154	159	+ 3
Eastern Europe and U.S.S.R.	83	105	133	137	140	134	146	149	167	168	176	171	180	+ 5
World [1]	87	103	120	122	126	129	132	134	140	145	150	151	154	+ 2

tries. No increase at all is suggested by the preliminary indices for the Near East, where output in all major countries except Turkey and Afghanistan remained virtually stationary or fell.

Changes over the longer term are of greater significance than the annual figures. In such a perspective the performance of developing countries is not very comforting, particularly in relation to population growth. Over the period from 1960 to 1970, the trend of per caput food production in the developing countries of both the Far East and the Near East was static, showed a barely perceptible rise in Latin America, and fell slightly in the developing countries of Africa (Figure I-1). Since population growth accelerated only marginally during the decade — between 1960-65 and 1965-69 it rose from 2.4 percent a year to 2.5 percent in Africa and the Far East, and from 2.7 to 2.8 percent a year in the Near East, but remained unchanged at 2.9 percent in Latin America — the widespread stagnancy in per caput output reflects mainly the failure of food production in these regions to accelerate.

The picture which emerges from an examination of more recent years is only slightly more encouraging. In 1970, per caput food production in all developing countries combined exceeded that of 1967 — the first year that may be considered "normal" after widespread bad harvests in 1965 and 1966 — by some 2.5 percent; but all this improvement reflects the gains achieved in the Far East where per caput production increased by 7 percent. In Latin America as a whole there was no increase, while in both Africa and the Near East the level has actually fallen in the last three years.

The rates of increase have, of course, varied between countries, and in each region some have succeeded in raising their output significantly. Equally, however, in a number of other countries — as can be seen from the tables and figures in Chapter II — the per caput food production has remained stable and in some cases has fallen alarmingly.

Production is a very approximate measure of changes in consumption, even though in most developing countries imports account for only a marginal

TABLE I-2. – INDICES OF WORLD [1] AND REGIONAL AGRICULTURAL PRODUCTION IN RELATION TO POPULATION (*concluded*)

	1948-52 average	1953-57 average	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (preliminary)	Change 1969 to 1970
	1952-56 average = 100													*Percent*
Per caput production														
ALL AGRICULTURAL PRODUCTS														
Western Europe	87	102	112	111	117	118	118	118	120	126	128	127	127	—
North America	100	98	98	96	98	102	99	99	99	101	101	99	98	— 2
Oceania	99	99	107	107	110	112	113	106	117	108	123	119	115	— 3
Other developed market economies [2]	87	103	112	115	121	120	120	120	123	141	139	138	136	— 1
DEVELOPED MARKET ECONOMIES	93	100	106	105	108	111	110	109	111	114	117	115	113	— 1
Latin America	97	100	102	105	103	103	101	105	100	103	99	100	101	—
Far East [3]	95	101	106	108	107	107	107	103	102	103	106	108	109	+ 1
Near East [4]	91	102	106	103	110	109	109	109	108	109	110	110	107	— 3
Africa [5]	94	100	105	98	103	104	104	103	100	101	101	102	100	— 2
DEVELOPING MARKET ECONOMIES	94	101	105	106	106	106	106	105	103	104	105	106	106	—
Eastern Europe and U.S.S.R.	87	104	120	122	123	117	126	127	141	141	145	139	146	+ 5
World [1]	93	101	106	106	108	108	108	107	109	111	112	110	110	—
FOOD PRODUCTS ONLY														
Western Europe	87	102	113	111	117	118	118	118	120	127	129	129	128	—
North America	99	99	100	98	99	104	101	102	104	107	107	105	103	— 2
Oceania	102	98	106	105	112	113	115	107	122	109	130	121	118	— 2
Other developed market economies [2]	87	103	114	116	124	122	122	121	126	145	144	142	142	—
DEVELOPED MARKET ECONOMIES	93	100	107	105	109	112	111	111	114	119	121	118	117	— 2
Latin America	97	101	99	102	101	102	103	104	102	105	102	103	105	+ 2
Far East [3]	94	101	107	109	107	107	108	104	102	103	107	108	110	+ 2
Near East [4]	90	102	105	103	108	107	106	106	106	107	108	107	104	— 3
Africa [5]	94	100	102	96	100	101	100	99	96	97	97	97	95	— 2
DEVELOPING MARKET ECONOMIES	94	101	104	105	105	105	106	104	102	104	105	105	106	+ 1
Eastern Europe and U.S.S.R.	87	104	122	123	124	118	127	128	143	142	147	141	147	+ 4
World [1]	93	101	107	106	108	108	109	108	111	113	114	112	112	—

[1] Excluding mainland China. – [2] Japan, South Africa and Israel. – [3] Excluding Japan. – [4] Excluding Israel. – [5] Excluding South Africa.

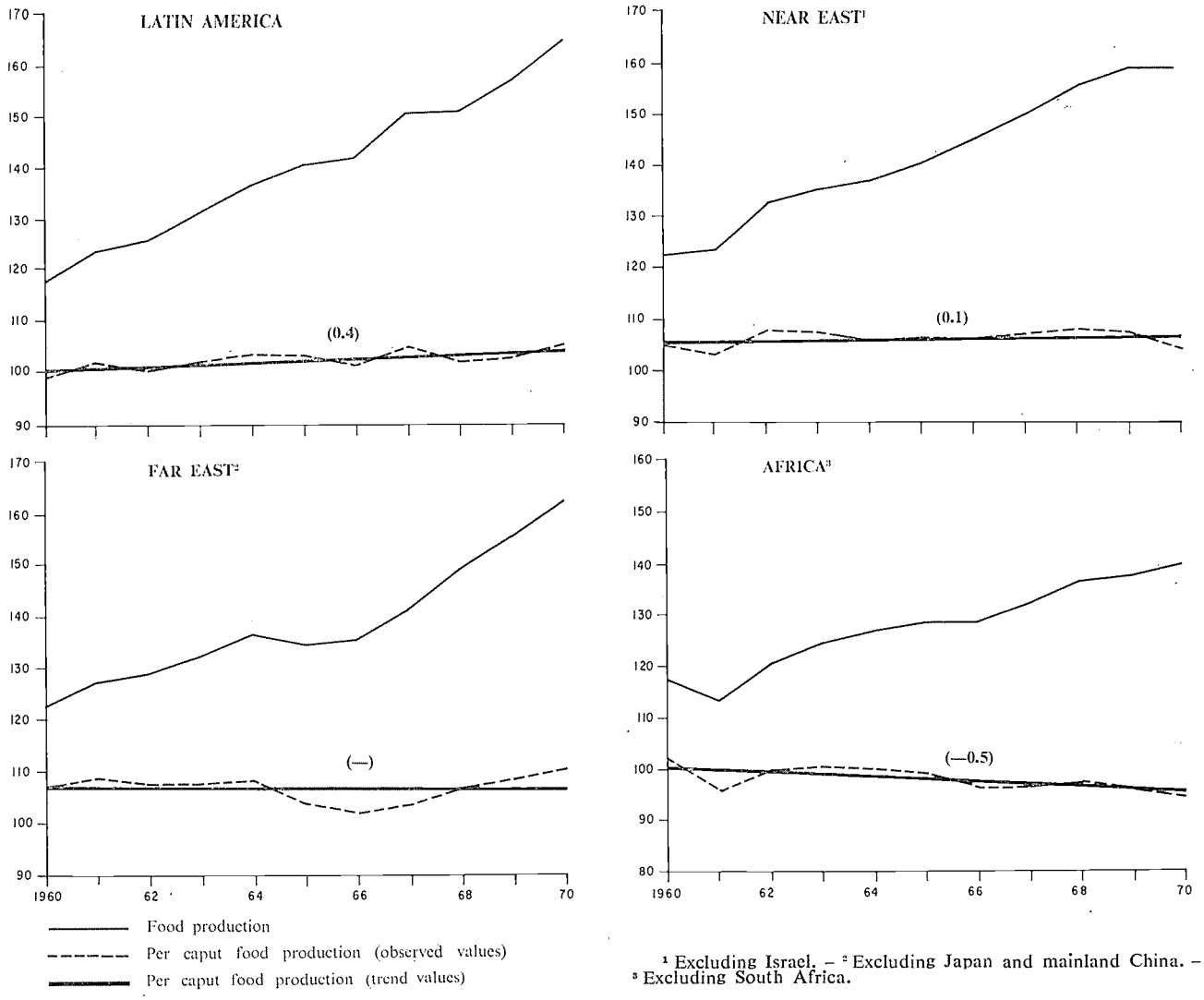
share of total food supplies. Moreover, not all developing countries need to make equal efforts to increase their domestic food production. In a few, food consumption is already relatively high and other aspects of development have priority. Others are in a position to import necessary foodstuffs without difficulty — for instance the major exporters of oil or minerals — or they may find it economically more advantageous to concentrate on cash crops for export or domestic processing. In others, again, total demand for food may be increasing only slowly, because of slow overall economic growth. Equally, many countries have been induced to stress food production for home markets because of the depressed state of and poor prospects for agricultural exports, and there is little doubt that many more developing countries could gain economic and social benefits from an accelerated increase in food production, particularly if it were based on the technological improvements that in recent years have characterized cereal cultivation in many countries of the Far East. Greater and more varied food production, and increased self-sufficiency in basic foods, are therefore among the priority goals of the development plans of the majority of developing countries.

Some implications of recent trends in food production

The recent performance of agriculture in the developing countries therefore raises questions about the significance of the recent technological advances in cereal cultivation for the food situation and prospects in these countries.

That they have made an impact on cereal production and trade in a number of countries is beyond doubt. The earliest successes with new wheat varieties made Mexico self-sufficient in that cereal in the late 1950s; indeed Mexico has recently disem-

FIGURE I-1. – TRENDS IN FOOD AND PER CAPUT FOOD PRODUCTION IN THE DEVELOPING REGIONS (1952-56 = 100)



[1] Excluding Israel. – [2] Excluding Japan and mainland China. – [3] Excluding South Africa.

Note: The figures in parentheses indicate the annual compound percent rate of growth of per caput food production on the trend line shown.

phasized wheat production in order to avoid surpluses that would be difficult to export. In the Far East, as is discussed in more detail in Chapter II, wheat yields and production in India and Pakistan shifted in 1968 to a very much higher level because of the new technology, and also the growth of rice yields and production has accelerated discernibly in a number of countries. The medium-term forecasts of cereal production presented below suggest, moreover, that these trends are likely to continue.

The increase in cereal production of the Far Eastern developing countries has also had a very visible impact on the cereal imports of some of the countries concerned, and indeed on the international cereal markets. Wheat imports by India have fallen from 6.3 million tons in 1967 to an estimated 3.4 million in 1970, and those of Pakistan from 2.4 million to 0.6 million in 1969. The Philippines has imported no rice since 1967, and Pakistan's imports fell from 149 000 tons in 1967 to only 16 000 tons in 1969. The increase in imports into some deficit countries in 1970, in apparent contrast to the above trend, is explained in part by losses due to natural disaster (Pakistan), in part by policy decisions to allow an increase in consumption levels (Ceylon, Indonesia).

The impact on trade, and the possibility that some other Far Eastern deficit countries may be able to dispense entirely with wheat or rice imports in the near future may, however, have given an exaggeratedly positive impression of the effect of the high-yielding varieties of cereals on the food situation. Thus, widespread use of the new varieties remains centred mainly in the Far East, where wheat produc-

tion rose between 1967 and 1970 by 70 percent, and rice production by 15 percent. In other developing regions a promising beginning appears to have been made in a number of countries in the Near East, and in a still smaller number elsewhere, but with a few exceptions (mainly the United Arab Republic, Kenya, Turkey) there has not yet been any visible impact on overall cereal yields and production. In the rest of the developing world, high-yielding variety programmes, if they exist at all, are still at planning or initial testing stages.

To a considerable extent, moreover, the additional cereal production in the Far Eastern countries appears to have been used to reduce imports and accumulate stocks. While this is a sign of progress, it does mean that the effect of high-yielding varieties on the consumption levels of the populations has generally — although not everywhere — been less than on total output and the import bill.

It should be noted that cereals, important as they are, still account for only a portion of the total food supply.[3] The rest of food production in the countries where high-yielding varieties of cereals are being used has on the whole not increased as rapidly as the output of wheat and/or rice. In particular there have been serious lags in many countries of the Far East in the production of pulses (an important source of protein in some countries), cereals other than rice and wheat, vegetable oils, and livestock products.

While an important breakthrough has thus been made in both the narrower sense of a shift by many farmers, mainly in the Far East, to a higher level of technology in cereal cultivation, and in the broader sense of demonstrating that such technological shifts are possible in the developing countries, much remains to be done before a true "green revolution" is achieved.

Thus continued efforts are required in those countries where an initial impact has already been made to maintain the momentum of progress and to spread its benefits also to the numerous farmers who for various reasons — the small size of their holdings, lack of supporting facilities, absence of varieties suitable for their ecological conditions — have so far not benefited from them. Measures now being taken in the Far East in this direction are discussed in Chapter II. In these countries it is also necessary to continue strengthening schemes for seed production, quality control and distribution, in order to make it possible for farmers to renew regularly their seed stock, which is in some cases reported to be deteriorating in quality through mixture with other seeds at threshing and storage. In some countries, moreover, advantage might usefully be taken of the breathing space provided by initial successes to test new varieties more thoroughly and at length in field conditions before releasing them for general use, in order to minimize the ever present danger of major outbreaks of disease.

Both in countries where progress has already been made, and in those where high-yielding variety programmes are still at an early stage, moreover, there is continued need for stepping up and diversifying research. In the former group it is a question not only of producing new varieties of cereals suited for ecological conditions in which the varieties so far developed do not thrive — particularly rice varieties for the rainfed and deep-flooded paddy fields of monsoonal Asia — but also of improving the fertilizer response and yield ceilings of other food crops, such as millets and sorghums, pulses, and oilseeds. An even greater task is awaiting the governments, institutes and scientists in other regions, where less progress has been made hitherto. This is particularly the case with Africa, where the ecological conditions over large areas make the results of much of the research carried out in the Far East and Mexico inapplicable, and where wheat and rice are not staple items of diet. International efforts to foster and coordinate research activities in the latter area are described in some detail in Chapter II.

Production of main agricultural commodities [4]

World production of wheat in 1970 remained unchanged at the 1969 level of 287 million tons. Output in the main exporting countries declined further, owing to area restrictions in North America and delivery quotas in Australia in efforts to reduce surplus stocks, and bad weather in Argentina. In western Europe, production declined by 5 percent. However, these reductions were offset by increases in several other areas. In the U.S.S.R., where the 1969 harvest had been poor, yields in 1970 were good and production recovered strongly. Increases were also recorded in several countries in Asia and north Africa, reflecting larger sown area and increasing use of high-yielding varieties in India and Pakistan, and favourable weather in Morocco and the United Arab Republic.

The output of coarse grains was smaller than in 1969. Maize production was 3 percent lower, as sharp falls in the United States (because of corn leaf blight), the U.S.S.R. and Romania were only partly offset by larger harvests in developing and

[3] On a price-weighted basis, rice and wheat combined account for just over 40 percent of the total food production of India and Pakistan, and rice for about 30 percent of the total food production of the Philippines and about 45 percent of that of Indonesia.

[4] For a detailed account of the commodity situation, see *FAO commodity review and outlook 1970-1971*. Rome, 1971. Production data for individual commodities are also shown in Annex table 1A of this report.

most other developed countries. Supplies in international markets were nevertheless somewhat short, and prices high. Production of sorghum, millet and barley was also the same as in 1969. Another new record was achieved in the production of rice, thanks to generally favourable weather and the further spread of high-yielding seed varieties in the main developing deficit countries. With shrinking markets, exporters generally tried to hold back their output, especially Japan and the United States where measures to restrict rice area were in force.

Among other major foods, world meat production is estimated to have expanded by about 4 percent. The production of red meat continued to lag behind other meats, especially in developing countries where it is estimated to have risen by only 1 percent. The expansion in beef production in Argentina was slight, due to severe drought in the latter part of 1970. There was a large increase (6 percent) in western Europe and a smaller one in Oceania. Output in North America remained unchanged, and a decline of 3 percent took place in the U.S.S.R. because of fodder shortage. Pigmeat production was up by 3 percent. The largest increases were in developing and centrally planned countries, but there was also a cyclical increase in developed countries. Poultry meat production was up sharply in the United States, the EEC countries and the U.S.S.R. World production of mutton and lamb increased moderately. Milk production showed only a marginal increase. There was a recovery from a low level in 1969 in the United States and the U.S.S.R., and a further expansion in Japan and developing countries. Production in eastern Europe remained unchanged, however, as well as in western Europe, where various measures are being applied to cut the growth of dairy production.

World sugar production in 1970 is estimated at 71 million tons raw sugar equivalent, 10 percent more than in 1969. There was a slight decline in beet sugar production due to poor crops in the U.S.S.R. and eastern Europe, but cane sugar reached a new peak thanks to the record Cuban output (80 percent above the previous season) and a good crop in India. After the temporary setback of the preceding year, world production of fats and oils resumed its long-term upward trend and again reached a new record level in 1970. Over two thirds of the expansion came from developed market economy countries, especially the United States (soybeans) and Canada (rapeseed). Smaller output was recorded in the U.S.S.R. (sunflowerseed) and African countries (groundnuts).

Total output of citrus fruits was expected to show another substantial increase in practically all producing areas, except some Mediterranean countries where weather was bad during the harvesting season. The harvest of pears reached a new record, leading to a surplus situation in western Europe. Apple production was 23 percent higher than in 1969, but still well below the levels of 1965 and 1967. World output of bananas increased by 4 percent with larger crops in some Latin American and African countries.

World coffee production declined in 1970 by 8 percent, to below the already low level of 1968. Crop failure in Brazil due to severe frost, drought and plant disease, and a poor harvest in Ivory Coast were mainly responsible. Production of cocoa reached a level second only to the 1964 record, with larger crops reported from Brazil and Nigeria. World output of tea also registered a new record, with increases in India and African countries more than offsetting the smaller harvest in Ceylon. Tobacco production was slightly larger than in the preceding year, reflecting substantial increases in a number of developing countries, particularly in Latin America.

Among agricultural raw materials, cotton production expanded fractionally. There were increases in the U.S.S.R. and in the United States, but these were balanced by declines in most developing countries, notably in Latin America. In Brazil and Mexico, the poor profitability of cotton led to a shift of area to other crops. In India and the United Arab Republic the reduction was mainly due to weather. World production of wool remained unchanged, reflecting drought losses in Australia and South Africa, shifts from sheep to cattle raising in Latin America and frost losses in the U.S.S.R. Rubber production was stationary, with virtually unchanged production in the two principal producing countries (Malaysia and Indonesia) because of unfavourable weather and steadily declining prices. World output of jute, kenaf and allied fibres was some 6 percent lower than in 1969, with smaller crops in Pakistan and India.

Table I-3 shows the first estimates of the changes in agricultural production in 1971. It must be stressed that since the figures shown are based in varying degrees on estimates and partial information, they can be considered only as rough indicators of the direction and magnitude of the change in output. This is particularly true about the developing regions, for which quantitative information is particularly short, but also the data for many developed countries are liable to be revised considerably.

In broad terms, the "early indicators" suggest significant changes in the recent trends of production in the developed countries, with both western Europe and North America showing substantial increases in output, and also Oceania recovering a good part of the output loss of the preceding two years. In the developing regions, the indicators — and their tentative nature cannot be overstressed — suggest somewhat better results in the Near East and Africa,

TABLE 1-3. – EARLY INDICATORS OF AGRICULTURAL[1] PRODUCTION IN 1971

	Increase 1970 to 1971
	Percent
Western Europe	6–7
North America	8–9
Oceania	2–3
DEVELOPED MARKET ECONOMIES[2]	7–8
Latin America	1–2
Far East[3]	2–3
Near East[4]	2–3
Africa[5]	3–4
DEVELOPING MARKET ECONOMIES	2–3
Eastern Europe and the U.S.S.R.	1–2
World[6]	4–5

NOTE: All figures are based to a varying degree on estimates and partial information. They are therefore to be considered only as indicators of the direction and rough magnitude of change.

[1] Excluding forestry and fisheries production. - [2] Including Japan, South Africa and Israel. - [3] Excluding Japan. - [4] Excluding Israel. - [5] Excluding South Africa. - [6] Excluding mainland China.

the two regions that appeared to have fared worst in 1970, but a smaller increase in Latin America and the developing Far East. The latter is reflected also in the smaller increase in the total for the developing countries. Besides, the combined production of eastern Europe and U.S.S.R. is estimated to have increased much less than in 1970, because of a stable level of output in the U.S.S.R. For the world as a whole (excluding mainland China) there would, according to these indications, be some acceleration in the growth of production over 1970.

The developments in 1971 are discussed in more detail in Chapter II. The increase in western Europe appears to have been fairly widespread, with only four countries showing a more or less unchanged level of production. Aside from better weather, factors which contributed to the increase included the improved market situation for cereals, following the disappearance of the surplus stocks of wheat, as well as higher prices for many products in EEC. The regional output of wheat, maize and barley reached a record level. Meat production also expanded substantially, with the exception of beef and veal, but milk output remained more or less unchanged, despite the relaxation of the measures to reduce the dairy herd. The large increase in North America, after three years of virtual overall stability would appear to be partly a consequence of the easing of the efforts to hold back production, following the improvement in the wheat stock situation, and the changes in the United States farm legislation. Other factors include good weather and large plantings of maize by United States farmers as a hedge against the possible recurrence of the corn leaf blight. In both Canada and the United States, total farm production appears to have reached a new record level. The increase in Oceania was probably smaller, since only a moderate recovery is likely to have taken place in Australia's wheat production, and dairy and wool production was down in both Australia and New Zealand.

In Latin America, the tentative indications suggest a rather smaller increase than in 1970. However, the total is again heavily influenced by the changes in Cuban sugar production, which this year is reported to have fallen back to a more normal level. If the latter is excluded, the increase in output promised to be more or less in line with that of 1970. Central American countries are likely to have done rather better than in 1970, when production in most of them fell, while the opposite is expected to have been the case for the Caribbean. In South America, the first indications are for widespread but moderate increases. Wheat and coarse-grain production recovered in Argentina and continued to grow rapidly in Brazil, where also the coffee production recovered from the severe setback of 1970.

The first indications for the developing countries of the Far East are somewhat disappointing relative to the progress of recent years, and bring home the narrowness of the margin of safety in the region's basic food supply, despite the significant technological progress achieved. In the main, it is true, the slowdown would seem to be due to factors extraneous to the technological progress, such as drought and cyclone damage and civil disturbances in East Pakistan and typhoons in the Philippines. There is also comfort in the fact that production in India promises again to increase at a rate in excess of the country's population growth. In the Philippines, however, an outbreak of a virus disease among some of the new rice varieties has also been a factor, and efforts are being made to avoid its recurrence by shifting to new seeds that are resistant to the virus. In the meantime, the affected countries have again been forced to increase their cereal imports. As for the future, many observers are now pointing out that the Far East region has been unusually fortunate in that the monsoons have occurred regularly for the past four years, a circumstance which cannot be counted upon indefinitely. The success of India in building up a cereal buffer stock of 8.6 million tons is particularly significant in this light.

In the Near East, the overall figure, which suggests some acceleration in output, is a composite result of widely varying national experiences: recovery of production in a number of countries in the western part of the region, because of better weather; persistent drought and severe reductions in output in Afghanistan, Iran and Iraq; and continued growth based on improving technology and good weather

TABLE I-4. – ESTIMATED WORLD [1] CATCH OF FISH, CRUSTACEA AND MOLLUSCS

	1948-52 average	1953-57 average	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (preliminary)	Change 1969 to 1970
	Thousand metric tons													*Percent*
DEVELOPED COUNTRIES	13 750	16 860	18 650	19 750	20 390	20 460	20 690	22 550	23 310	24 690	25 880	24 940	25 770	+ 3
Western Europe	6 360	7 530	7 720	7 960	8 240	8 500	9 150	10 240	10 880	11 270	10 960	10 420	10 960	+ 5
North America	3 470	3 800	3 750	3 950	4 100	3 970	3 820	3 930	3 870	3 710	3 940	3 870	4 090	+ 6
Oceania	70	90	110	110	110	110	120	130	140	150	160	140	150	+ 7
Other developed countries [2]	3 850	5 440	7 070	7 730	7 940	7 880	7 600	8 250	8 420	9 560	10 820	10 510	11 570	+ 10
DEVELOPING COUNTRIES	5 140	6 830	11 440	13 550	15 820	16 540	20 260	18 510	21 250	22 970	24 600	23 640	28 110	+ 19
Latin America	800	1 300	4 900	6 780	8 750	8 900	11 670	9 460	11 650	12 820	13 640	11 920	15 470	+ 30
Far East [1,3]	3 150	3 900	4 740	4 890	5 080	5 570	6 250	6 490	7 000	7 430	8 270	8 760	9 440	+ 8
Near East [4]	350	400	390	410	430	490	520	500	490	550	500	570	630	+ 11
Africa [5]	810	1 190	1 340	1 380	1 470	1 500	1 750	1 800	2 030	2 080	2 110	2 310	2 490	+ 8
Other developing countries [6]	30	40	70	90	90	80	70	80	80	90	80	80	80	—
CENTRALLY PLANNED COUNTRIES														
Eastern Europe and U.S.S.R.	1 900	2 620	3 400	3 630	4 020	4 470	5 050	5 730	6 020	6 510	6 930	7 380	8 210	+ 11
World [1]	20 790	26 310	33 490	36 930	40 230	41 470	46 000	46 790	50 580	54 170	57 410	55 960	62 090	+ 10

NOTE: Figures refer to the weight of the catch in metric tons. The annual changes in percentage terms may therefore differ considerably from those in Table I-1, where the quantities of production are weighted by the unit values, as indicated in the explanatory note to the Annex tables.

[1] Excluding mainland China and other Asian centrally planned countries. – [2] Israel, Japan, South Africa. – [3] Excluding Japan. – [4] Excluding Israel. – [5] Excluding South Africa. – [6] Includes developing countries in North America and Oceania regions.

in Turkey and the United Arab Republic. For Africa, the highly tentative indications suggest a recovery of output in the Maghreb countries and in southern Africa, but only moderate increase in output in the other subregions.

Fishery production

World fishery production in 1970 recovered from a moderate decline in 1969 to a new record level of about 62 million metric tons. The largest increase was in the South American fisheries of raw material for processing into fish meal, but increases were achieved also in the other regions (Table I-4).

Until 1969, world catches had been uninterruptedly growing in volume ever since the postwar reconstruction of fishing fleets. Although the 1969 catch decline was reversed in 1970, estimates for the first six months of 1971 again indicate a reduction, with fish-meal output in the six most important producing countries (Angola, Chile, Iceland, Norway, Peru and South Africa) more than a quarter lower than a year earlier, and poorer catches of some important food fish species in Europe and North America. Fish production in the near future is not, in fact, likely to increase as fast as it did in the 1960s. Some of the more important stocks are subjected to heavy fishing pressure and cannot be expected to yield substantially more. The relatively few larger sized undeveloped resources have not to date attracted investment and will remain largely untouched until plans for raising the capital for their exploitation and utilization have been drawn up and put in motion. In many countries, moreover, rapid technical obsolescence of fishing equipment, high debt burdens and interest charges, rising labour costs, lack of skilled skippers, and other factors are impairing efficiency. Of growing concern, too, have been the effects of marine pollution on fisheries, and some fish considered potentially dangerous for human health have been withdrawn from markets. Efforts are being intensified everywhere, therefore, to conserve, protect and develop fishery resources and to cut down on costs.

On a regional basis, the most significant developments of the last decade have been the growing role of Latin American and centrally planned countries. In contrast, western Europe's and North America's shares of world production have been gradually declining. The U.S.S.R. and most other centrally planned countries have drawn up plans for further expansion in their fisheries. These countries and developing countries of the Far East, on the east

coast of South America, and possibly also on the Indian Ocean coast in the Near East, are expected to take the major share of future increases in world catches over the coming years. Some growth, though on a more modest scale, can be expected also in Africa and Oceania, while elsewhere production is not likely to change very much from current levels.

Forest production

There was only a slight increase in world forest production in 1970. Roundwood removals may have increased fractionally. Those of fuelwood are estimated to have remained unchanged, with increases in the developing regions, in line with population growth, offsetting the continued decline in developed regions. Industrial wood removals rose by only about 1 percent in 1970. They fell in North America, but this was more than offset by further increases in Europe, the Far East, and the U.S.S.R. (Table I-5). No basic improvement in the overall situation was evident in 1971.

Demand for forest products was strongly influenced by overall economic developments in the main consumption areas. Consumption was held back in North America in 1970, due to the slowdown of economic growth and the slump in the construction sector. An improvement in activity started, however, toward the end of the year, and the demand for sawn softwood and for softwood plywood in 1971 has been very much stronger. A contrary trend was seen in western Europe where, after the 1969 boom conditions in many countries, which continued during the early months of 1970, there was a marked deceleration in growth rates. The sector of the market most obviously affected was pulpwood and wood pulp, which changed from a sellers' to a buyers' market in the autumn of 1970 and led to restriction of output of a number of products in 1971. Strong growth of the Japanese economy continued in 1970, although some slowing down is foreseen for 1971, already reflected in the forest products market by efforts to lower stocks of imported logs and reduced levels of forward buying.

In global terms, the net effect of these trends on forest products markets was only a slight increase in sawn softwood output in 1970, while sawn hardwood output remained more or less unchanged. There was a marked slowing down in the rate of growth of particle board production in western Europe, which still accounted for over 50 percent of world output. The latter in consequence rose by 11 percent in 1970 compared with 18 percent in 1969. This growth rate was still, however, far higher than for any other forest product. There was moderate growth in plywood and fibreboard production, a drop in North American plywood output being more than offset by increases elsewhere, notably Japan.

Growth of world output of pulp slowed down from over 7 percent in 1969 to 3 percent in 1970, the most marked deceleration occurring in North America. A similar trend took place in the production of paper and paperboard. As mentioned earlier, the previously tight wood pulp supply position eased considerably in the latter part of 1970. While quoted prices have remained unchanged so far in 1971, following substantial increases over the previous two years, producers are attempting to restore market balance by the temporary closedown of mills, while waiting for a recovery in demand in the United States, by far the largest consumer, and western Europe.

TABLE I-5. – INDICES OF WORLD [1] ROUNDWOOD PRODUCTION

	1953-57 average	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (preliminary)	Change 1969 to 1970
	1952-56 average = 100												*Percent*
Saw and veneer logs	103	118	116	120	122	129	124	125	128	133	135	135	—
Pulpwood and pitprops	104	120	121	122	120	129	135	140	146	143	147	149	+ 1
Other industrial wood	101	100	93	92	97	98	131	134	133	136	142	150	+ 6
All industrial wood	103	116	114	117	119	126	127	129	132	135	138	139	+ 1
Fuelwood	101	99	100	101	104	106	107	107	106	106	107	107	—
TOTAL ROUNDWOOD	102	112	111	113	115	121	122	123	126	128	130	131	+ 1

[1] Excluding mainland China.

Surplus stocks

During the past year government policies in developed countries, poor weather in some areas, and the increasing reluctance of farmers in high-income countries to accept the exactions of dairy farming have very considerably reduced surpluses of wheat, coarse grains and dairy products. Rice stocks, however, have risen again (Table I-6), and the problem of excess capacity for fruit production in western Europe was accentuated.

The emergence and continued growth of rice stocks is a facet of the changing situation in the world rice economy, in part as a result of the increased production in the Far East following the introduction of high-yielding varieties. Lower world prices, increased availability of rice on concessional terms, and reduced import requirements for current consumption have enabled a number of developing rice-importing countries to increase their stocks as a guard against production setbacks and to help stabilize domestic prices. India is maintaining imports at a higher level than would otherwise be needed while a stock of 6 million tons of foodgrains is accumulated.

The reverse side of the coin is the involuntary accumulation of stocks not only in the United States and Japan, but also in some developing exporting countries, such as Thailand, the Khmer Republic (where a very large crop was harvested in 1970), and Brazil. This reflects both the reduced import requirements of some traditional Far East rice importers, and also the competition in export markets from concessional disposals and subsidized sales.

Concessional sales have risen rapidly in recent years, from an average of only some 600 000 tons a year in 1964-66 to 1.8 million tons in 1970, equal to a quarter of total world rice trade. Of total concessional sales, Japan accounted for about 0.6 million tons, an increase of some 0.3 million tons over the 1969 level. Concessional exports from the United States declined slightly to just over 1 million tons as production fell in response to acreage restrictions. In Japan, too, the Government has taken steps to cut back rice production (see p. 97), and output in fact fell from 18.2 million tons in 1969 to 16.5 million tons in 1970 (paddy). Consumption, however, is also contracting and the 1970 crop was still about 1 million tons more than domestic use. Despite the increase in exports, therefore, total government-held stocks rose to 12 million tons (milled) in October 1970, the end of the 1970 crop year, compared with 9.4 million tons in October 1969.

The erosion of developing countries' commercial rice export markets represented by the increase in concessional sales, coinciding with dwindling overall import demand, has made it necessary for exporters to review their production plans. China (Taiwan) has reduced its 1971 target by 5 percent in area and 2 percent in output to 2.6 million tons. Malaysia, among importers, has recently decided to aim at only 90 percent self-sufficiency in rice, in order to avoid the emergence of surpluses in years of good harvest. In the meantime, the principal developed country exporters, Japan and the United States, continue their efforts to restrict production. In the United States the rice acreage allotments, which were reduced in 1970 by 15 percent, will be maintained at that level for the 1971 crop. In Japan, as discussed in more detail in Chapter II, fairly drastic measures have been undertaken both to reduce output and to increase domestic consumption, including feed use, but concessional exports are likely to continue for the next few years.

Total wheat stocks in exporting countries are expected to fall by 15 million to 51 million tons by the end of the 1970/71 season. Area and delivery restrictions very much reduced output in 1970 in North America (especially Canada) and Australia, and drought in Argentina caused a fall to the lowest level since 1960. Exports in 1970 were estimated to be about 45 million tons, 24 percent more than in 1969. Small crops in western and eastern Europe and Japan raised import demand, while the shortage of United States maize increased demand for feed wheat, and concessional sales remained larger than expected because of imports by India (for buffer stock) and Pakistan (for East Pakistan typhoon and flood relief). Despite the reduction, exporters' end-of-season stock will still be about 15 million tons more than in 1966 or 1967, when it was generally agreed that the surplus element in carryover stocks had been eliminated. Canada's wheat stocks in particular are expected to be a good deal above normal requirements, and those of the United States and Australia less so. Government efforts to reduce stocks therefore need to be continued, the more so because demand for milling wheat may fall, although demand for feed wheat could rise still higher if the United States maize crop is again reduced by blight.

Coarse grain stocks, held mainly by the United States, have fallen in 1970/71. Output in the United States fell by 14 million tons because of drought and corn leaf blight, while demand rose with the continued rise in livestock production and because feedgrain crops in western and eastern Europe and Japan were small. By the end of the 1970/71 season United States stocks are expected to be below the desirable carryover level. Even so, under the 1971 Feed Grain Programme the price support loan level has been raised only for grain sorghums. It has been held level for maize and reduced for barley, oats and rye. The EEC has raised target and intervention prices by amounts varying from 1 percent for wheat to 5 percent for barley.

TABLE I-6. – STOCKS OF SELECTED AGRICULTURAL PRODUCTS

	Date	1960-62 average	1963-65 average	1966	1967	1968	1969	1970	1971 (estimated)
Wheat		*Million metric tons*							
United States	1 July	36.7	26.4	14.6	11.6	14.7	22.3	24.1	19.5
Canada	1 Aug.	14.5	13.3	11.4	15.7	18.1	23.2	27.5	20.7
Argentina	1 Dec.	0.7	2.2	0.2	0.4	1.1	0.4	0.7	0.2
Australia	1 Dec.	0.9	0.6	0.6	2.3	1.4	7.3	7.4	5.4
European Economic Community	1 July	6.0	6.6	6.8	5.4	7.6	[1]10.1	[1]5.6	[1]5.0
TOTAL OF ABOVE		58.8	49.1	33.6	35.4	42.9	63.2	65.3	50.8
Coarse grains [2]									
United States [3]	1 July	70.2	57.0	38.6	34.2	44.2	45.7	44.3	34.4
Canada	1 Aug.	4.0	4.8	4.5	4.9	4.4	6.7	6.9	5.9
Argentina	1 Dec.	0.4	0.3	0.1	0.6	1.8	1.9	1.8	1.8
Australia	1 Dec.	0.1	0.3	0.6	0.9	0.8	1.2	1.5	1.5
European Economic Community	1 July	5.2	5.1	4.9	4.8	6.5	5.9	3.8	4.0
TOTAL OF ABOVE		79.9	67.5	48.7	45.4	57.7	61.4	58.3	47.6
Rice (milled equivalent)									
EXPORTING COUNTRIES									
Pakistan [4]	31 Dec.	...	0.11	0.06	[5]0.02	0.19	0.24	0.28	...
Thailand [6]	31 Dec.	0.05	—	0.04	—	[6]0.06	[7]0.30	[8]1.10	...
United States [9]	1 Aug.	0.29	0.24	0.26	0.27	0.21	0.52	0.52	0.59
Japan [10]	31 Oct.	—	—	—	—	—	9.36	12.00	...
TOTAL OF ABOVE		...	0.35	0.36	0.29	0.46	10.42	13.90	...
IMPORTING COUNTRIES									
India [4]	31 Dec.	0.84	0.45	0.40	...	1.03	1.64	1.74	...
Japan [10]	31 Oct.	3.74	2.86	3.38	5.85	7.03	—	—	...
TOTAL OF ABOVE		4.58	3.31	3.78	...	8.06	1.64	1.74	...
Butter									
Canada and United States		0.15	0.10	0.04	0.11	0.08	0.08	0.09	...
European Economic Community [11]		0.08	0.11	0.15	0.20	0.33	0.34	0.16	...
Other European countries [12]		0.05	0.06	0.07	0.08	0.10	0.09	0.05	...
Australia and New Zealand		0.07	0.06	0.07	0.06	0.07	0.09	0.07	...
TOTAL OF ABOVE	31 Dec.	0.35	0.33	0.33	0.45	0.58	0.60	0.37	...
Dried skim milk									
United States		0.23	0.12	0.05	0.12	0.13	0.10	0.07	...
European Economic Community		...	...	...	0.20	0.31	0.39	0.18	...
TOTAL OF ABOVE	31 Dec.	...	...	...	0.32	0.44	0.49	0.25	...
Sugar (raw value)									
WORLD TOTAL	1 Sept.	15.1	13.4	19.2	19.1	20.6	19.6	21.0	18.3
Coffee									
United States	30 June	0.18	0.22	0.21	0.15	0.20	0.20	0.21	0.17
Brazil	30 June	3.05	3.48	3.95	2.96	3.13	2.43	1.74	1.14
Cotton (lint)									
United States		1.64	2.74	3.66	2.72	1.39	1.41	1.25	0.93
WORLD TOTAL [13]	31 July	4.38	5.58	6.63	5.90	4.78	4.99	4.67	4.09
		Thousand metric tons							
Tea									
United Kingdom	31 Dec.	87.9	97.1	98.9	99.5	126.7	100.3	111.0	...
India	31 Dec.	50.3	61.3	70.3	65.6	68.6	66.4	70.0	...
Ceylon	31 Dec.	34.8	32.6	37.3	23.0	27.5	39.4	30.0	...

[1] From 1969, 1 August (except Federal Republic of Germany, 1 June). – [2] Barley, oats, maize, sorghum and rye. – [3] Maize and sorghum, 1 October. – [4] Government (or official agency) stocks only. – [5] November. – [6] Old crop for export. – [7] September. – [8] 31 January 1971. – [9] Converted from paddy to milled rice at 69.5 percent. – [10] Government stocks only. – [11] Excluding Italy. – [12] Denmark, Finland, Ireland, Sweden, Switzerland, United Kingdom. – [13] Including estimates of cotton afloat.

Stocks of dairy products have also been reduced to a normal level, and prices have risen steeply. Milk production in 1970 in western Europe, the main surplus-holding area, remained unchanged, as factors tending to increase output per cow were countered by bad weather, the success of policy in securing a switch to beef production in the EEC countries and Austria, Switzerland, Ireland and Finland, and the longer term trend of farmers to shift away from dairy farming. Butter production was reduced by the further increase in demand for cheese and fresh milk products. Simultaneously there was a big increase in exports, partly within the EEC and to eastern Europe, but mainly under heavy subsidy from EEC to developing countries. Food aid exports of butter and butter oil from EEC are estimated to have been 20 000 tons, and additional quantities have been disposed of domestically through special arrangements. In the case of skim milk powder there was an increase in both commercial sales and food aid deliveries to developing countries, where an expanding milk recombining industry has become the main outlet for skim milk powder and butter oil. Food aid deliveries from EEC are estimated to have been about 40 000 tons. By mid-1971 the international prices of both butter and skim milk powder had reached record levels, and were expected to remain relatively high through the 1971/72 season.

Milk production in western Europe will probably rise again in 1971/72, but the newly regained market balance is not expected to be disturbed since the portion of the total used for products other than butter and dry skim milk will continue to grow. Only in the United States are butter stocks expected to rise. The latest surplus phase in the world dairy economy may thus be considered to be over. An underlying element of surplus capacity still exists in the industry, however, and in the longer term the reemergence of surpluses, in response to changes in relative prices, animal feeding practices, and other factors, cannot be excluded.

In the meantime, a surplus situation has emerged in the production of hard fruit, especially pears in western Europe, particularly in EEC where price supports and export aids have encouraged a great deal of new planting. Partly due to good weather and partly as a result of the coming into production of young plantings, pear production in EEC rose 15 percent to 3 million tons in 1970/71 — half the world output. Since these products cannot be stored, surpluses are withdrawn from markets and largely destroyed. By the end of November 1970, almost 550 000 tons of the season's production of pears had been withdrawn in Italy, and in the Netherlands 46 000 tons had been withdrawn by 1 March 1971. The phenomenon is not new — since the establishment of the Common Market Organization for Apples and Pears on 1 January 1967 total withdrawals have been 825 000 tons of pears and 500 000 tons of apples — but the quantities involved were greater than ever before. Surplus capacity continues to exist in spite of policy measures to reduce it, and further withdrawals and destruction will probably be necessary in years of abundant crops.

There was a small increase in stocks of tea in the United Kingdom, where they had been depleted in 1969 from the earlier high level, but prices have been well maintained, in part because of the Mauritius Agreement between main exporters to limit shipments of black tea. Longer term implications of the present tea development and replanting programmes, however, suggest excess supply and renewed demand pressures on tea prices. Coffee stocks in producing countries at the end of the 1970/71 season are likely to have been the lowest since 1958. The predominant reason is the great reduction in the Brazilian crop due to frost in Paraná and drought in São Paulo. The unofficial estimate of Brazil's stock on 30 June 1971 is 1.14 million tons — 600 000 tons less than a year earlier. The anticipated improvement in Brazil's 1971/72 crop is not expected to be big enough to prevent a further reduction in its stock.

Food prices

The present inflationary trend, which has seen an acceleration of price increases especially in the last two to three years, has been particularly marked in the developed countries. In some of them, including the United States and Canada, consumer prices rose in 1970 at more than double the average rate of the first half of the 1960s. For the year as a whole, price increases were greater than in 1969 in 17 out of 23 developed countries shown in Annex table 1D, including the United States, Italy, the Federal Republic of Germany, the United Kingdom and Japan. In the first half of 1971 there were signs of a slowdown of inflation in Canada, France and the United States, but in most other major developed countries the situation remained uncertain.

The generally abundant supplies of most foods in the developed countries, the declining income elasticities of demand for food, and the generally more

rapid growth of productivity in agriculture than in other sectors are factors which would tend to keep down the increase of food prices in the course of general inflation. Other factors, however, work in the opposite direction, insulating agricultural prices from the effects of changes in production and tying their movements to those in the general price level. These include the use of price policies for supporting farm incomes, the pressures for maintaining farmers' earnings at "equitable" levels, and the growing share of marketing and processing costs and direct taxes in the price of the final product. The farm value of the retail food "basket" in the United States was 37 percent in the mid-1960s ; in Sweden it was about 50 percent in 1964 and is thought to have fallen to some 40 percent by 1970. Moreover, experience indicates that when the general price level rises steeply, as it has done recently, prices go up even in sectors where productivity gains are well above average. In most developed countries, in fact, increases in food prices have rather paralleled increases in those of other consumer goods, and in Japan, where the demand for many foods is increasing rapidly while productivity growth is held back by the small size of the average farm, food prices have been increasing much faster than the general price level.

Consumer prices in developing countries

Inflation has for a long time been more rapid in developing than in developed countries. Among 55 developing countries for which data are available, consumer prices rose in 39 during the past decade by over 20 percent per year, in some cases by a very wide margin. The import prices of developing countries have on the whole risen as a result of the recent acceleration of inflation, but so far there is no evidence of a general speeding up of price rises. In a number of individual countries where inflation had been very rapid, including Argentina, Brazil, Peru and Uruguay, the end of the decade saw it very much slowed, in some cases virtually stopped. However, growing food shortages in many countries and the increasing use of price incentives have put particular pressure on food prices, and in almost half the countries for which data are available food prices have increased more rapidly during the past decade than general consumer price indices.

Given the efforts made by many developing countries to increase their cereal production, however, it is encouraging to note that in some this has contributed to an easing of price pressures in the last few years. Not that they have decreased in absolute terms: the general inflationary trend, together with reduced cereal imports in some countries, at times combined with increased support prices, have tended to keep cereal prices rising. In many cases, however, increases have been smaller than those of other items in the cost of living, so that cereal prices have declined in relative terms.

Cases in point are India and Pakistan where, as described in Chapter II, wheat production has almost doubled from the low level of 1966. In India wheat prices, which in 1966 and 1967 had risen steeply, fell back only slightly in 1968 and rose again in 1969 and 1970. The general level of consumer prices also rose, however, and in each of the last three years wheat prices fell in relative terms. At the same time imports declined by 60 percent, and considerable quantities were diverted to stocks. Reports in early 1971 indicate, moreover, that cereal prices are now declining, and that the drop has sufficiently reduced the differential between wheat supplied by government agencies and on the free market to cause many consumers to shift to the latter. In Pakistan, wholesale wheat prices also rose sharply in 1966 and 1967. Subsequently they fell sharply in 1968, and again slightly in 1969. Although they increased somewhat in 1970, both absolutely and in relation to the overall cost of living index, they remained below the 1968 level. Other food prices showed fairly sharp rises, however, reflecting a growing imbalance between demand and supply. In Turkey, wheat prices have not fallen in absolute terms, but relative to the index for all items they had declined by 1970 to a level some 30 percent below the peak in 1961.

In the case of rice, prices in India have declined in relative but not in absolute terms from the scarcity level of 1966. In the Philippines, prices remained stable in relative terms over the past decade as production increased steadily, and fell both absolutely and in relative terms in 1968 and 1969 following the particularly large 1967 crop. An upward trend in prices is reported to have started again in late 1969, touched off by a reduction in the size of the crop in 1968. It was reinforced by the hoarding of supplies by traders and strong demand pressures in late 1969, and by typhoon damage to the 1970 harvest. In the Republic of Korea, prices increased as a result of poor crops in 1967 and 1968. The harvest was very much better in 1969, but the price rise accelerated in 1970, in part because of higher government purchase prices for foodgrains. Prices in Indonesia also rose until early 1970, but eased later in the year as the supply situation improved. In Thailand wholesale prices of rice reached a peak in 1967 as production fell by 13 percent, but have since fallen both in absolute and relative terms, in line with international prices and adjustments in export taxes.

International trade

Preliminary estimates [5] of world trade in agricultural products indicate that there was probably a substantial increase of some 14 percent in the value of exports in 1970.[6] If confirmed later, this would be the largest rise since the Korean war boom in 1952 and would mark the first time that the growth of agricultural trade matched that of total world trade (Table I-7). The value of both fishery and forest product exports also increased substantially, although for the latter the expansion (6 percent) was considerably less than the 15 percent achieved in both 1968 and 1969.

In 1970 prices received for agricultural exports increased for the second year in a row, although the rise was somewhat less than it had been in 1969. In contrast to 1969, when the total volume of agricultural exports remained unchanged, a 10 percent expansion in volume in 1970 made a major contribution to the growth in export earnings.

[5] The preliminary indices of international trade exclude not only the Asian centrally planned economies, but also eastern Europe and the U.S.S.R. for which insufficient data are available to enable the indices to be computed. Data for other regions are also incomplete, and the estimates presented at this time must be used cautiously as substantial revisions are often made later in the year.

[6] It should be noted, however, that except for fishery and forest products, the FAO indices refer essentially to primary commodities and exclude trade in processed products of agricultural origin. This omission results in an underestimation of the agricultural sector's contribution to total export earnings, and is also likely to understate the growth of trade in agricultural products.

Although the increase in agricultural export earnings of the developing regions combined is thought to have been substantial, the results were probably uneven between regions and, as in past years, the developed regions as a whole gained relatively more. Both Latin America and Africa are preliminarily estimated to have obtained large increases (11 and 17 percent, respectively), while for the Far East and the Near East the rises were smaller. For the developed regions, too, the results were uneven, ranging from a 6 percent increase in earnings for Oceania to 14 percent for western Europe and 28 percent for North America. Of special interest was the sharp recovery in the agricultural exports of North America which, after three years of contraction, regained the peak of 1966.

Prices in international trade

The average increase in prices of agricultural exports (3 percent) was less than in 1969 (4 percent), but the rises were more general in terms of the numbers of commodities involved (Table I-8). There were substantial increases (of 5 percent or more) in the average unit value received for maize, sugar, vegetable oils and oilseeds, meat, butter, cheese, coffee and tea exports in 1970, and although wheat

TABLE I-7. – INDICES OF THE VOLUME, UNIT VALUE AND TOTAL VALUE OF WORLD [1] TRADE IN AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (preliminary)	Change 1969 to 1970
	1957-59 average = 100														*Percent*
VALUE OF EXPORTS	103	96	101	108	110	112	124	136	137	142	140	145	154	174	+ 12
Agricultural products	104	96	100	106	109	110	123	134	133	137	134	134	140	160	+ 14
Fishery products	92	101	107	108	113	134	136	155	171	187	185	194	211	245	+ 16
Forest products	101	95	104	114	115	115	125	142	149	157	161	185	212	226	+ 6
VOLUME OF EXPORTS	99	97	104	111	117	120	127	134	137	140	140	148	150	162	+ 8
Agricultural products	99	97	104	110	117	119	125	131	134	136	135	140	139	152	+ 10
Fishery products	93	102	106	111	118	131	133	149	147	146	160	172	167	173	+ 3
Forest products	98	96	106	117	120	122	134	148	153	161	165	187	204	211	+ 3
AVERAGE EXPORT UNIT VALUE	106	100	95	98	95	94	99	103	101	101	100	98	103	106	+ 3
Agricultural products	106	100	94	98	95	93	100	104	101	101	99	97	101	103	+ 3
Fishery products	99	99	102	98	100	105	106	109	119	129	122	121	129	144	+ 11
Forest products	104	99	97	97	95	94	94	96	98	98	97	99	105	107	+ 2
Total value of world [1] trade (agricultural and nonagricultural)	101	97	102	114	119	125	136	153	166	182	191	214	245	280	+ 14

[1] Excluding centrally planned countries.

TABLE I-8. – INDICES OF WORLD [1] AVERAGE EXPORT UNIT VALUES OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (preliminary)	Change 1969 to 1970
	1957-59 average = 100														Percent
Agricultural, fishery and forest products	106	100	95	98	95	94	99	103	101	101	100	98	103	106	+ 3
AGRICULTURAL PRODUCTS	106	100	94	98	95	93	100	104	101	101	99	97	101	103	+ 3
Food and feedstuffs	102	99	99	97	96	97	106	109	108	109	109	106	109	112	+ 3
Cereals	102	100	98	96	97	103	103	105	104	109	113	111	109	104	— 5
Sugar	112	96	92	89	88	89	131	136	98	95	93	93	108	114	+ 6
Vegetable oils and oilseeds	101	98	101	97	95	91	97	97	106	104	99	98	95	107	+ 13
Fruit	105	104	90	92	94	96	102	98	100	103	104	102	104	104	—
Meat	95	101	104	107	105	102	106	119	127	132	129	126	136	143	+ 5
Dairy products	104	92	104	103	96	96	102	104	114	109	108	102	105	104	—
Beverages and tobacco	104	104	92	89	84	81	84	93	90	90	90	91	93	101	+ 8
Coffee	114	103	83	80	76	73	72	93	90	86	78	81	81	100	+ 23
Cocoa	79	118	103	83	66	63	68	70	53	56	76	83	109	108	— 1
Tea	102	100	98	100	98	94	95	93	90	86	85	78	71	76	+ 7
Tobacco	103	98	99	98	93	92	101	95	96	104	101	101	101	99	— 1
Agricultural raw materials	118	99	84	108	101	96	101	101	94	92	85	82	89	86	— 3
Wool	126	89	85	92	90	89	102	113	92	95	86	76	83	75	— 10
Cotton	110	101	88	94	97	92	92	91	93	85	84	89	88	91	+ 4
Rubber (natural)	101	87	112	126	93	89	85	78	75	74	61	54	72	65	— 10
Jute and kenaf	109	100	91	115	151	101	104	84	112	117	117	105	117	117	—
FISHERY PRODUCTS	99	99	102	98	100	105	106	109	119	129	122	121	129	144	+ 11
FOREST PRODUCTS	104	99	97	97	95	94	94	96	98	98	97	99	105	107	+ 2
Roundwood (excluding fuel)	103	100	97	105	107	107	106	108	112	115	115	115	122	122	—
Processed wood	104	98	98	98	96	95	96	99	102	102	99	105	115	116	+ 1
Wood-based panels	102	99	99	96	94	96	97	93	95	97	95	96	102	103	+ 1
Pulp and pulp products	104	99	97	95	93	90	89	92	93	92	93	93	95	99	+ 4

[1] Excluding centrally planned countries.

prices averaged lower for the year as a whole they remained stable during the first half and increased substantially during the second. For many commodities, including maize, sugar, meat and some oils and oilseeds, the increases represented the continuation of an upward trend already evident in 1969 or even earlier.

An important feature of the price situation in 1970 is that increases were probably of relatively greater benefit to the developing regions — notably Latin America and Africa — than to the developed ones. Increases in the prices received for their exports — coffee, sugar, bananas and maize in the case of Latin America, and coffee, tea, sugar and cotton in the case of Africa — together with a substantial expansion in the volume of shipments from Africa, raised earnings from agricultural exports substantially. The developed regions and the Far East, on the other hand, in overall terms gained little or nothing from price increases, and the average unit value of the Near East's agricultural exports was reduced as a result of lower unit values for rice, tobacco and, in contrast to world price trends, cotton.

The recent widespread inflation [7] had an important impact on international trade generally in 1970. In that year the unit values of the developed countries' exports and imports are estimated to have risen more than their consumer prices. While this tendency has no doubt also influenced prices and unit values of primary products, in the majority of cases it is possible to identify specific conditions and expectations in particular commodity markets which appear responsible for the price rises.[8] Thus upward pressure on prices due to a relative shortage of supply in relation to demand was clearly evidenced for grains, oils and oilseeds, meat and butter. Grain prices tended to move upward during all or most of 1970 and there were increases in the average export unit values of maize (10 percent), oats (17 percent) and sorghum (49 percent), reflecting the tighter demand/supply situation in world coarse grain markets. The average unit value of wheat exports was some 5 percent lower than in 1969 — despite the fact that prices rose substantially during the second half of the year — reflecting short supplies, partly because of policy-induced reductions in North America and

[7] See p. 12-13.

[8] For a more detailed discussion of developments in agricultural commodity markets see *FAO commodity review and outlook 1970-1971.*

partly because large amounts were used to fill the gap caused by the shortage of coarse grains for livestock feeding. The prices of virtually all vegetable oils and oilseeds rose in 1970, with especially large increases in those exported from the temperate zones, in particular soybean, rapeseed and sunflowerseed oils. Among the tropical oils, palm oil prices rose most sharply, and those of groundnut and coconut oil less. There had been a major setback in world production of oilseeds in 1969, and although output recovered sharply in 1970 supplies were still scarce relative to demand, boosted by higher consumption in developing countries and the replenishment of inventories. Added to this was the strong demand for soybeans for the manufacture of meal and cake, stimulated by the expansion of animal numbers and by the high prices of maize and fish meal. With the exception of poultry, of which supplies were abundant in 1970, meat prices continued their long-term upward trend. For dairy products, there was a complete switch in the world market situation following the largely policy-induced disappearance of butter and dry skim milk stocks (see p. 12). The average unit value of butter exports increased by 5 percent, after a decline in each of the previous four years.

There were also substantial increases in the export unit values of sugar, cotton, tea and, especially, coffee. World market prices of sugar rose progressively during 1970 and for the year as a whole averaged 3.68 U.S. cents per pound, 15 percent higher than in 1969, in part because of the strict regulation of exports under the International Sugar Agreement and in part because world sugar production in 1971 was expected to fall while consumption was expected to continue to increase. Preferential prices under the Commonwealth Sugar Agreement remained unchanged in 1970, while those paid by the United States were almost 5 percent higher. Cotton prices recovered in 1970, and the unit value of exports rose by some 5 percent. Increases for most types of cotton ranged from 2 to 10 percent, with prices of shorter staples rising faster than those of long. Prices of extra-long staples declined, affecting particularly the United Arab Republic where the abundant crop in 1969/70 had caused stocks to accumulate. Tea prices also experienced a partial recovery from the extremely low level of the previous year, reflecting increased trade (despite strikes and slowdowns in exporting and importing countries), the replenishment of stocks in the United Kingdom, and the regulation of exports through the informal tea arrangement. The most spectacular price rise of the year occurred for coffee, as actual shortages in Brazil coincided with reports of spreading rust disease, prompting purchasing for stocks in importing countries. Prices of all types of coffee rose during 1970 to levels higher than at any time since the middle or late 1950s, with those for Brazilian Unwashed Arabicas showing the largest increases. As a result of increases in export quotas under the International Coffee Agreement during the second half of 1970, and of a more flexible price policy adopted by Brazil in February 1971, prices of Arabica coffees declined far below their peak levels, but remain high. Robusta prices have remained at peak levels.

Wheat apart, the most important food crop experiencing a reduction in export unit values in 1970 was rice, by some 17 percent. Prices had begun falling in 1969, but the average unit value for that year had declined by less — some 8 percent — being maintained by long-term contracts made in earlier periods. In 1970, however, the situation worsened, not only because the decline in prices accelerated, but because larger shipments were being made on concessional terms by developed countries. The volume of developing countries' rice exports therefore rose by only 2 percent compared to 16 percent for developed countries, and their share in total world rice trade declined to some 45 percent, compared with an average of 64 percent in 1964-65. At the same time the further increase in carryover stocks in both importing and exporting countries rules out the possibility of any improvement in prices in the near future.

Important too, in 1970, was the weakening in raw material prices, particularly for wool and rubber, but also for sisal and henequen, reflecting both the slowdown in economic activity in industrialized countries and the continued erosion of the markets by synthetics. Wool suffered from the worst price fall in recent years, largely because of stiffening competition from man-made fibres which most seriously affected merinos and fine crossbreds. Prices of sisal and henequen also fell drastically in early 1970 (the average export unit value averaged some 6 percent lower for the year as a whole) forcing small estates to close in some producing countries and promoting shifts to more remunerative crops in others. The deterioration of rubber prices, although related to the economic slowdown in importing countries as in the case of other raw materials, was also linked to the high level of production in 1970 stimulated by the high prices which prevailed in 1969 and to stockpile releases by the United States Government.

Data on unit values received for agricultural exports in 1971 are not yet complete, but export price quotations for the first half of the year have generally continued to rise. Among the principal exceptions were rice, beverages, and many oils and oilseeds and agricultural raw materials. For all agricultural commodities combined, export prices probably averaged some 2 to 3 percent more than a year earlier.

Value of agricultural exports

The value of world agricultural exports in 1970 was some 14 percent higher than in 1969. As in 1969, higher prices contributed to the increase, but a 10 percent rise in the volume of shipments was mainly responsible. The expansion involved most major commodities, with the exception of some raw materials of agricultural origin, and coffee and tobacco. For a number of items, including sugar, meat, maize, oils and oilseeds, dairy products, tea, and cotton, the greater volume coincided with higher prices, suggesting that supply shortages in importing countries were at the origin of the increase. For others, including rubber, rice and wheat, prices were lower but were partly or fully compensated for by the volume expansion. As a result, the value of trade of most individual commodities was larger in 1970 (Table I-9).

As already pointed out, the incompleteness of trade data for the developing countries at the time of writing makes the indices for these regions highly tentative. With this reservation in mind, the preliminary indices suggest that the combined value of their agricultural exports rose in 1970 by some 10 percent, about double the rate of the previous year which, in turn, seems to have been higher than was first estimated (Table I-10). The largest gains seem to have been made by Latin America and Africa and, if the data are confirmed, the 1970 value of agricultural exports from these two regions will be well above earlier peak levels. In Latin America, the concentration of exports on commodities for which prices were higher in 1970 — grains, sugar, bananas, beef and veal, cotton and, especially, coffee — was mainly responsible for the substantial increase in earnings. For only a few — sugar, bananas and coarse grains — were shipments also larger. For Africa, on the other hand, both prices and volume contributed to the increased earnings, mainly from exports of beverage crops, sugar and cotton. The value of exports from the Near East and Far East is also estimated to have increased, but by considerably less. In the first region, the expansion in the volume of cotton exports was the only positive element; shipments of other commodities were smaller and prices were generally lower. In the Far East, higher prices were received for exports of oils and oilseeds, sugar, coffee and tea, but these were partly offset by the sharp reduction in rice and rubber

TABLE I-9. – INDICES OF THE VALUE OF WORLD[1] EXPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS, BY MAIN COMMODITY GROUPS

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (preliminary)	Change 1969 to 1970
	1957-59 average = 100														*Percent*
Agricultural, fishery and forest products	103	96	101	108	110	112	124	136	137	142	140	145	154	174	+ 12
AGRICULTURAL PRODUCTS	104	96	100	106	109	110	123	134	133	137	134	134	140	160	+ 14
Food and feedstuffs	100	97	102	108	116	120	140	156	159	165	164	162	169	199	+ 18
Cereals	101	98	101	108	127	134	156	183	185	201	187	175	166	193	+ 16
Sugar	117	97	86	101	107	97	140	144	115	109	116	119	127	161	+ 26
Vegetable oils and oilseeds	100	94	106	109	108	113	124	134	147	150	143	148	146	199	+ 36
Fruit	103	100	97	105	109	119	119	128	140	151	156	156	166	169	+ 2
Meat	90	101	109	115	119	127	152	172	185	196	200	208	240	264	+ 10
Dairy produets	98	91	111	107	105	103	115	126	133	134	144	141	153	186	+ 21
Beverages and tobaeco	103	102	95	97	96	96	101	112	107	110	112	117	121	138	+ 14
Coffee	110	98	92	91	88	89	95	113	106	112	106	116	116	136	+ 17
Cocoa	86	106	108	104	93	91	99	101	96	87	114	122	152	162	+ 6
Tea	99	105	97	99	102	102	104	102	103	93	100	94	80	94	+ 18
Tobacco	105	99	96	102	109	108	116	125	122	127	134	130	134	129	— 4
Agricultural raw materials	113	88	99	111	107	100	108	107	101	99	88	90	97	95	— 2
Wool	122	83	95	98	104	101	115	118	103	108	90	90	97	90	— 8
Cotton	119	94	87	116	111	97	109	111	105	101	96	102	95	102	+ 7
Rubber (natural)	95	83	122	122	99	98	92	84	84	79	66	68	96	88	— 9
Jute and kenaf	100	108	92	108	130	114	106	96	145	159	143	118	112	109	— 2
FISHERY PRODUCTS	92	101	107	108	113	134	136	155	171	187	185	194	211	245	+ 16
FOREST PRODUCTS	101	95	104	114	115	115	125	142	149	157	161	185	212	226	+ 6
Roundwood (excluding fuel)	100	95	106	131	149	145	166	182	197	219	254	310	374	405	+ 8
Processed wood	103	95	102	114	109	109	118	132	133	130	128	153	171	175	+ 3
Wood-based panels	88	91	121	116	118	134	153	182	205	222	233	285	336	344	+ 2
Pulp and pulp products	103	96	102	111	112	110	118	135	141	152	154	168	190	206	+ 9

[1] Excluding centrally planned countries.

TABLE I-10. – INDICES OF THE VALUE OF AGRICULTURAL EXPORTS BY REGION

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (preliminary)	Change 1969 to 1970
	1957-59 average = 100														*Percent*
Western Europe	101	98	100	111	116	120	139	151	163	168	182	190	218	249	+ 14
North America	107	96	97	115	123	119	135	159	153	170	151	146	133	170	+ 28
Oceania	110	85	105	102	112	112	133	147	134	132	138	121	141	150	+ 6
ALL DEVELOPED REGIONS [1]	106	94	100	110	118	119	136	153	151	159	158	156	164	191	+ 17
Latin America	105	99	96	99	100	103	112	121	125	123	117	127	128	143	+ 11
Far East [2]	101	93	106	109	103	102	112	111	109	106	101	100	103	108	+ 5
Near East [3]	110	91	99	102	96	101	113	114	123	127	123	129	135	138	+ 3
Africa [4]	96	104	100	100	100	99	107	119	113	113	108	116	117	136	+ 16
ALL DEVELOPING REGIONS	102	98	100	102	101	102	111	117	118	116	111	114	119	130	+ 10
ALL ABOVE REGIONS	104	96	100	106	109	110	123	134	133	137	134	134	140	160	+ 14
Eastern Europe and U.S.S.R.	93	89	118	114	138	145	149	134	153	165	198	188	199	...	...
World [5]	103	96	101	107	111	112	125	134	135	139	138	138	144	...	...

[1] Including Israel, Japan, and South Africa. – [2] Excluding Japan, mainland China and other Asian centrally planned countries. – [3] Excluding Israel. – [4] Excluding South Africa. – [5] Excluding mainland China and other Asian centrally planned countries.

unit values and by the failure of the volume of most exports (except rice and tea) to increase more than marginally.

For the developed regions, the principal feature of 1970 was the steep recovery in the agricultural exports of North America — which had declined for three successive years — back to the 1966 level. The increase, which represented higher earnings for both Canada and the United States, was mainly due to larger shipments of wheat, coarse grains and soybean oil. For western Europe, the rapid growth shown over the longer term was maintained, while for Oceania earnings increased somewhat less than in 1969, when they had recovered from the low level of 1968. A more detailed discussion of trade in individual regions is contained in Chapter II.

Agricultural imports

On the import side, at the time of writing sufficient data for the calculation of a volume index were available only for the developed regions and for the developing countries of the Far East. For the developed regions, the indices show an increase of 4 percent, while the partial data available for the Far East (excluding Japan) suggest a sharp increase, which has been preliminarily estimated at 12 percent (Table I-11).

The imports of all western European countries combined rose by some 3 percent, about the same rate as the previous year, with intra-EEC trade continuing to be an important dynamic element. North American imports increased only slightly (1 percent), following the sharp drop of the previous year, and remained below the peak level of 1968. For both regions, the slowdown in economic activity in 1970 had a depressing effect on imports of raw materials, which fell by 2 and 7 percent, respectively. Trade in textile fibres was particularly affected, cotton and wool imports into western Europe falling by 4 percent each, and those of wool into North America by 19 percent, as mill consumption in the United States declined sharply. These reductions were clearly reflected in the smaller volume of trade in all agricultural raw materials combined except cotton, for which larger purchases by Japan (where stocks were being rebuilt), Australia, and several developing countries provided some buoyancy. Imports of rubber were also slightly larger, reflecting increased purchases by Japan, Italy, the Federal Republic of Germany, and again some developing countries.

The partial data available for the developing regions suggest a sharp rise (slightly more than 10 percent) in imports of cereals in 1970, after two years of decline, bringing the total to a level some 10 percent below that in the peak year of 1967. There were increases in all the regions except Latin America, where the peak had been reached in 1968. In the Far East (excluding Japan), the increase in the volume of cereal imports is estimated at about 17 percent, and since these account for some 40 percent of all agricultural imports combined, they were an important element in raising the total by 12 percent. The increase is, however, unlikely to signal a change in the trend of falling grain imports into the region, which still remain almost 10 percent below the peak reached in 1967, since it appears to have

TABLE I-11. - INDICES OF THE VOLUME OF AGRICULTURAL IMPORTS BY REGION

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)	Change 1969 to 1970
	1957-59 average = 100														*Percent*
Western Europe	100	97	103	107	109	114	116	118	122	127	126	128	133	137	+ 3
North America	95	97	108	101	106	115	113	104	107	112	113	124	115	117	+ 1
Oceania	98	102	100	101	104	95	105	110	120	117	110	113	117	127	+ 8
ALL DEVELOPED REGIONS [1]	99	97	104	107	110	116	118	119	124	130	129	134	137	142	+ 4
Latin America	99	102	99	103	108	115	125	140	136	147	144	153	145	...	...
Far East [2]	103	98	98	121	117	117	133	143	145	158	173	169	165	185	+ 12
Near East [3]	95	94	111	124	137	138	141	149	169	171	174	173	155	...	...
Africa [4]	100	95	105	119	131	128	112	116	131	136	151	151	140	...	...
ALL DEVELOPING REGIONS	100	98	102	116	120	122	129	138	144	154	162	163	154	...	...
ALL ABOVE REGIONS	99	97	104	109	112	116	120	122	127	134	135	139	139	...	...
Eastern Europe and U.S.S.R.	94	95	111	117	129	129	137	168	167	162	157	148	145	...	...
World [5]	99	97	104	109	113	118	121	126	131	136	137	139	140	...	...

[1] Including Israel, Japan and South Africa. – [2] Excluding Japan and mainland China. – [3] Excluding Israel. – [4] Excluding South Africa. – [5] Excluding mainland China and other Asian centrally planned countries.

been due largely to short-term factors such as cyclone damage in East Pakistan and to decisions to build stocks in a year when low prices made purchases particularly attractive. In fact, owing to these low prices the rise in the value of cereal imports was considerably less than the rise in volume.

For the other regions, estimates based on partial data also indicate increases in imports of cereals, of about 25 percent in the Near East and 10 percent in Africa, bringing imports to a little more than 10 percent below those of the peak years 1968 and 1967. The cereal trade of the developing countries is discussed in more detail in Chapter II.

Trade in fishery products

The value of world trade in fishery products is estimated to have increased at the extremely rapid rate of 16 percent in 1970 and to have exceeded $3 000 million for the first time. The virtually uninterrupted upward trend of volume in the postwar period continued, but high prices during most of the year contributed the greater part of the rise in value. The value of trade has thus nearly doubled over the last decade, and 40 percent of the world catch now enters international trade compared to about 30 percent 10 years ago.

The fisheries exports of developing countries have expanded much faster during the last decade than those of developed countries. Latin American and Far Eastern countries have done particularly well, as in 1970 when these regions increased their earnings by 32 and 14 percent respectively. Centrally planned countries are now also relatively more important in trade, although their combined share of world export earnings is still below 5 percent. Among the seven major fishery commodity groups, growth in both volume and value has been fastest for fish meal and for crustacean products. Fresh, chilled or frozen fish has, however, been the largest group in terms of value since 1960.

Most of the food fish trade is between developed countries, although the Republic of Korea and China (Taiwan) are of increasing importance as tuna exporters, while Morocco and a few other developing countries are traditional exporters of canned sardines. In contrast, the developing countries play leading roles in the trade in crustacean and fish meal products. Strong demand for food fish in 1970 in the principal import markets, the United States, Japan, and western Europe, was reflected in a record trade volume and rising prices for all important products, including groundfish fillets and blocks, fresh, frozen and canned salmon, tuna products, and canned sardines. New factors of some importance are the growing popularity of frozen fish in Europe and the opening of numerous fish and chip shops in the United States.

Greater fishing effort on resources already subject to high pressure has led to rising production costs. To some extent these were accommodated by the market, and strong demand superimposed on general inflation drove up prices of groundfish products to record levels in 1970. Toward the end of the year, consumption of some items was beginning to be curtailed by high prices, but the 1971 market outlook for groundfish products as a whole was considered bright.

Demand for tuna and sardines was strong and both prices and the quantity of trade were higher. The effect of the mercury scare in late 1970 on United States tuna markets proved to be temporary and production and imports during the first half of 1971 were actually higher than in 1970. The 1971 salmon pack in Canada and the United States is expected to be smaller but the carryover from the large 1970 pack should help to prevent a steep rise in prices.

Although quantitatively small, trade in shellfish products — largely shrimp from developing countries — accounts for about a quarter of the total value of world trade in fishery products. The United States is the principal market, consuming about one third of world shrimp production, half of it imported. The only other important markets are Japan (the fastest growing outlet) and a few western European coumtries, especially France. Shrimp prices in the United States have risen almost continuously since 1960. The fall in producer and wholesale prices in mid-1970 was attributed to temporary overstocking, and by the beginning of 1971 prices were moving upward again. In Japan, developments in the shrimp market were similar to those in the United States, as prices weakened because of a temporary glut and rising inventories.

Despite a reduction in the developing countries' exports of shrimps to the United States during the first half of 1971, the longer term outlook would seem to be one of further expansion in the world shrimp trade, and for an increasing share for developing countries as suppliers, as new shrimp fisheries are launched off the coasts of Africa, Asia and Latin America. Shrimp has no direct substitute, and the only potential threats to demand would seem to be economic recession or dissatisfaction with product quality. Export prospects for some developing countries in the immediate future are more likely to be affected by supply than by demand considerations.

For fish meal, imports into the United States, the largest importer until a few years ago, fell in 1970 to one third of their 1968 level and continued to decline in 1971. The principal cause was high prices which led to continued substitution by soybean meal in compound feeds. Major western European importers, particularly the Federal Republic of Germany, reacted similarly, although less drastically. In the case of Peru, the reduction of shipments to these markets was more than offset by increases in exports elsewhere, particularly to centrally planned countries, and the value of the country's fish meal exports increased by 25 percent. Early in 1971 world prices for fish meal declined following a build-up of stocks in Peru and in Norway, where catches in 1970 were exceptionally good. By August, a moderate reduction in stocks, largely due to increased sales by Peru, had brought about some recovery in prices, but not enough to raise them to the level of 1970.

Trade in forest products

Trade in forest products continued to expand rapidly in 1970, although in both volume and value terms growth was somewhat less than it had been in 1968 and 1969. Although this deceleration, which appears to have continued into 1971, affected all regions, both developed and developing, it was more marked in the case of the latter where growth had been particularly dynamic during 1968 and 1969. In 1970, earnings are estimated to have been smaller in all developing regions except the Far East, where they expanded by about 4 percent, compared to almost 30 percent in each of the two preceding years.

The growth of world trade in roundwood accelerated in 1970. The volume of exports of the three main assortments — pulpwood, coniferous and broadleaved logs — was nearly 80 million cubic metres, an increase of some 12 percent, compared with a 9.5 percent increase in 1969. There was a renewed upsurge in Japanese roundwood imports, which rose by 16 percent. Its imports of coniferous logs from North America, the U.S.S.R. and New Zealand rose appreciably, and those of broadleaved logs from southeast Asia, particularly Indonesia, continued to grow. The growth of pulpwood chip trade in the Pacific basin, consisting of coniferous chips from North America and broadleaved chips from a number of southeast Asian countries and Australia to Japan, also continued to expand.

Western European imports of pulpwood in roundwood form rose strongly in 1970 (by about 32 percent) reflecting the tight supply position that had developed in some countries in 1969 and the early months of 1970. Intra-European trade accounted for the larger part of the increase, but imports from the U.S.S.R., eastern Europe and Canada also rose strongly. Pulpwood prices increased sharply, although there were signs of levelling out toward the end of the year as pulp mill stocks rose and forward demand softened.

After the massive growth in western Europe's imports of broadleaved logs in 1969 there was a reversal in 1970, with imports, notably from west Africa, falling by over 500 000 cubic metres. The biggest declines occurred in the Federal Republic of Germany, France and the United Kingdom, while exports from Ivory Coast, Ghana and Nigeria suffered the largest reductions. Prices for a number of species were weak, notably for sipo and others of the mahogany group, but with further hardening of

freight rates, the c.i.f. costs to importers were less affected than f.o.b. prices.

World trade in sawn softwood reached record levels in 1970, with exports exceeding 48 million cubic metres. Shipments from North America rose by over 1 million cubic metres, with Canadian exports to the United Kingdom recovering strongly after falling to low levels in the previous two years, when North American prices were less competitive in Europe. Canadian and United States exports to Japan and a number of other markets also rose, but despite an upturn in the last quarter those to the United States remained below the 1969 level. In western Europe, there was a 15 percent drop in imports into Italy, where stocks were high and building activity low, but this was rather more than offset by higher imports of the Federal Republic of Germany, the United Kingdom and Yugoslavia, with the latter country emerging as a substantial importer for the first time. Western Europe's trade in sawn softwood reached a record level in the last quarter of 1970, due partly to efforts to catch up on delays caused by the British dock strikes in the summer and partly to the mild winter which caused no end-of-year navigational problems in northern waters. U.S.S.R. exports were slightly lower in 1970, but were offset by a recovery in shipments from eastern Europe.

World trade in sawn hardwood changed little in 1970. A sharp fall in North American imports and exports was counterbalanced by growth elsewhere. Several European countries further increased their imports of tropical sawn hardwood from Malaysia and Singapore, but those of France and Belgium, where growth had been particularly strong in 1968 and 1969, were lower. Exports from Africa were somewhat smaller than in 1969, while sawn hardwood exports from France, partly aided by the devaluation of the franc in 1969, rose by 24 percent.

Export volume of plywood and veneers and of fibreboard remained close to 1969 levels. Imports of plywood and veneers into North America fell. The adverse effects on west European fibreboard exporters were offset by higher intratrade of plywood, veneers and fibreboard in the region. Eastern European trade in fibreboard, particularly imports, continued to rise strongly in 1970. Production and trade in particle board slowed down in 1970, notably in western Europe which accounts for the bulk of the world total.

Wood pulp exports, consisting mainly of chemical wood pulp, rose by about 4 percent in 1970. Exports from northern Europe fell slightly, principally because a larger part of domestic production was processed into paper and paperboard. Northern European exports to North America fell, and a still larger part of their total shipments was concentrated on the European market. Despite pulp mill strikes in British Columbia which reduced Canadian exports, and weaker import demand in the United States, North American exports of wood pulp rose appreciably, with increased volumes shipped to western Europe and Japan. The United States exported considerably more wood pulp than in 1969, as market pulp exports were augmented by surplus supplies from integrated mills. As noted earlier, the balance of the wood pulp market changed completely during the latter part of 1970, and the buyers' market that developed then still existed in mid-1971.

Trade in newsprint in 1970 remained at the 1969 level; reduced intra-North American trade was counterbalanced by increased intra-European trade. Exports of other paper and paperboard continued to rise strongly, with all the main exporting areas — western Europe, North America and Japan — sharing in the growth, and all regions increasing their imports.

International trade policies

During 1970 and 1971 the search for new initiatives in the field of international trade policies continued, both overall and relating specifically to agriculture. Although some important steps forward were taken, including decisions by the European Economic Community (EEC), Japan and the United Kingdom to grant general preferences to developing countries, and the implementation of the fourth of the five annual instalments of tariff reductions agreed under the Kennedy Round, there was growing concern in many quarters over signs of a resurgence of protectionist trading policies and of a tendency for the world to split into separate trading groups centred around areas of special preferences. These events have contributed to a growing awareness that, because countries are becoming increasingly interdependent, national agricultural policy decisions cannot be taken without regard to their impact on other countries, just as international policies cannot be effective unless national policies take account of them. This realization has led to a search for new approaches to national agricultural adjustment in an international frame.

The most important immediate problem facing the trading nations is the resurgence of protectionism. The widespread acceleration of inflationary pressures which has aggravated balance of payments difficulties has caused several countries to resort to import restrictions in an attempt to find an immediate solution to these problems. In the United States and other important industrial countries the growth of protectionist sentiment is threatening the maintenance of liberal commercial policies. A new

element of uncertainty is the 10 percent import surcharge introduced by the United States as a part of the new economic policy announced in August 1971. While it would seem that developing countries are less likely to be injured by the surcharge [9] than the developed countries because of the exclusion of nondutiable imports (such as coffee, cocoa, tea and bananas) and of those already subject to quantitative limitations (such as meat and sugar), they are nevertheless asking for general exemption claiming that the surcharge negates the progress made toward generalized preferences under UNCTAD.

At the same time, the lack of momentum toward further trade liberalization on a global level since the completion of the Kennedy Round negotiations in 1967 has coincided with the strengthening of the regional economic groupings which, while giving a powerful stimulus to the acceleration of trade within them, have caused difficulties for nonmember countries. This was amply demonstrated by the problems which emerged during the negotiations for the entry of the United Kingdom into EEC.

It is in response to these tendencies that the Ministerial Council of the Organization for Economic Cooperation and Development (OECD) decided, in June 1971, to establish a top-level study group composed of nationals of eight to ten of the world's major trading countries to consider ways of removing the remaining obstacles to world trade. Although the time is not yet considered ripe for entering into a new round of trade liberalization negotiations, it was felt that an examination of current and prospective trade issues — including inter alia agricultural policies — and the development of action guidelines for dealing with them, could make an important contribution toward keeping alive the spirit of freer trade and preventing a cycle of new restrictions.

Insofar as agricultural trade is concerned, it has clearly failed to benefit more than marginally from any of the recent initiatives. The general preferences which have been granted to developing countries by EEC, Japan and the United Kingdom apply only to finished and semifinished manufactures, and include only a limited number of products of agricultural origin. The United Kingdom has specifically excluded textiles from its offer, and while EEC has not done likewise it has set a ceiling on textile imports which is likely to allow very little growth above present levels. Similarly, the fourth of the five annual rounds of tariff reduction which had been agreed under the Kennedy Round negotiations, and which took place on 1 January 1971, provided little benefit for agricultural trade. Work in the General Agreement on Tariffs and Trade (GATT) Committee on Agriculture has continued and now provides the technical basis for the liberalization of agricultural trade, but as yet no concrete action has been initiated.

The method which in the past has seemed to offer the most realistic hope for putting order into international markets for agricultural products — the commodity by commodity approach — has recently suffered setbacks. The negotiations of agreements for wheat, rice and cocoa have not succeeded, and the International Sultana Agreement was discontinued. For dairy products, the GATT Arrangement Concerning Dairy Products remained in existence, but the change in the butter market situation from a position of surplus to one of shortage precluded the need for action. On the other hand existing commodity arrangements — both formal and informal — continued to function with varying degrees of success.

The International Coffee Agreement weathered a serious crisis in mid-1970 when a sharp upswing in coffee prices resulted in a decision, taken without the concurrence of Brazil, to set the initial quota for 1970/71 at 54 million bags, 8 million more than the initial quota for 1969/70 and 2 million more than the final effective one. As prices continued to rise during the second half of the year, further increases in quotas were made. Subsequently, however, the high quota level, some weakening of demand in anticipation of later price reductions and the adoption of a more competitive price policy by Brazil caused prices to decline substantially. In March and April 1971 reductions in the quota were made which brought the total down to 49.5 million bags, 4.5 million less than the initial figure, and in August the initial quota for 1971/72 was set even lower, at 47 million bags. The fact that the Agreement has managed to maintain some degree of control in a highly volatile market situation despite the divergence of interests not only between producing and consuming countries but also among the producing countries themselves is clearly an achievement. At the same time, the International Coffee Council's review of national plans for coffee diversification has been virtually completed, and in many cases the work has reached the project stage.

The International Sugar Agreement also continued to function successfully in 1970, its second year of operation. Export quotas were maintained at the initially established level of 90 percent of basic tonnages, but there were substantial shortfalls, part of which were reallocated in the latter part of the year as prices rose. For 1971 initial quotas were set higher, and subsequently raised still more to 110 percent. With these and other measures the price rise was checked in mid-March. In May 1971 the

[9] United States estimates indicate that some 30 percent of their exports would be subject to the surcharge, as opposed to 60 percent for the developed countries.

quotas were therefore reduced and the decision taken to make redistribution of shortfalls conditional on an improvement in prices.

Of the informal arrangements, the international export quota and minimum price arrangements for sisal and henequen, which had broken down in February 1970, were renegotiated by the producer countries on an interim basis in February 1971. The arrangements for 1971 finally decided in May represent a major step forward in that the new agreed national export quotas represent a definitive sharing of the world market, with future changes in the global export quota to be made by pro rata changes in national ones.

The Consultative Committee on Jute, Kenaf and Allied Fibres decided in February 1971 to recommend the same ranges of indicative prices for the 1971/72 season as in the recent past, despite the fact that world export supply appeared likely to fall short even of the declining import demand. This decision stemmed from increasingly clear indications that synthetic substitutes for jute were advancing rapidly in many major consuming countries and would only be further stimulated by higher prices. At the same time, it was decided that there was no general support for the Pakistan Jute Board's proposal for stabilizing prices through the creation of an international buffer stock. In an attempt to limit the advance of synthetic substitutes through improvements in the productivity and quality of jute and kenaf and the development and promotion of new end uses for them, the United Nations Development Programme (UNDP) began a feasibility study for an international promotion and research centre for these fibres in late 1970, which is to be completed toward the end of 1971.

The informal arrangement for tea, begun in 1969, is credited with having contributed substantially to the recovery in prices in 1970. It was extended into 1971 and discussions are in progress for a formal long-term arrangement. For cocoa, wheat and rice, the conclusion of effective commodity agreements has not proved to be possible, although for cocoa discussions continue, and for wheat and rice the situation is being kept under continuing review.

In all cases, whether the number of countries involved is relatively small and the commodity relatively uncomplicated as in the case of tea, or whether problems are more complex, as in the case of rice, difficulties centre around finding prices and export quotas or other regulatory techniques which are both effective and widely acceptable. It is, in fact, on the proper choice of the regulatory mechanisms that the success or failure of the agreements depend. This was demonstrated by the failure of the Wheat Trade Convention of the 1967 International Grains Arrangement, the price provisions of which were virtually ineffective from the start, to prevent international wheat prices from falling below the agreed minima.

The new International Wheat Agreement (IWA) which was negotiated in early 1971 does not contain any price provisions or related obligations. Some exporters felt that tighter controls — either on production or exports or both — would be required in order to maintain an acceptable price level, but no agreement could be reached on this principle. Negotiations on prices and related matters were made even more difficult by uncertainties surrounding the present world market situation and the outlook for trade in wheat in the years immediately to come, and in the end no agreement could be reached either on the range of prices to be established or on the definition of a reference wheat to which prices of other wheat would be related. As a result, only a limited agreement was reached on a new Wheat Trade Convention (WTC),[10] which maintains a framework for cooperation and consultation and establishes a new advisory subcommittee to keep the world wheat market under constant review. It thus provides the framework for subsequent price negotiations if they are considered desirable.

In the case of rice, the problems which precluded agreement on international price and trade stabilization measures were similar, although the market situation was quite different. Growing concern over problems of increasing surpluses, falling prices, and the disruption of trade by large sales on concessional terms in the period under review had prompted the FAO Rice Study Group, at its fourteenth session in May 1970, to establish an Ad Hoc Working Party on International Action on Rice to consider possible solutions. The latter, in November 1970, agreed that the basic cause of these problems was the over-supply situation which had developed in recent years. The Working Party examined 15 proposals for international price and trade stabilization agreements for rice but decided against recommending further consideration of them at the present time. It was felt that the inherent complexities of the situation — the many varieties of rice, the large number of importers, the conflicting positions of the developed and developing exporting countries, and the fact that a few important exporters, including mainland China, would remain outside any agreement — made it unfeasible to consider such arrangements.

Partly, too, because it seemed clear that an essential prerequisite to any effective international agreement was the reduction of national production, it was instead decided to recommend action to governments in the field of national production and trade policies

[10] A description of the other section of IWA, the Food Aid Convention, is given on p. 30.

which the Group considered would be of use in mitigating the current problems. This approach was endorsed at the fifteenth session of the Study Group in May 1971, and the Director-General of FAO was asked to transmit formally a set of guidelines to governments with the request that they be taken into account in formulating national actions. The guidelines recommend, inter alia, that the developed exporting countries should, during periods of over-supply on world markets, reduce production or avoid measures which encourage an increase in production, and that recourse to export subsidies, payments or restitutions on rice be minimized. A review of national action taken to adjust supplies to demand on world markets will be included as a standing item on the agenda of future meetings of the Study Group, so that further action can be taken if considered necessary.

Concern over the spread of concessional transactions in world rice trade and the need to safeguard normal commercial trade also prompted the Group to request governments of exporting countries to expedite their acceptance of the usual marketing requirements (UMRs) which had been established by the October 1970 session of the Committee on Commodity Problems (CCP) as a means of safeguarding usual commercial trade in commodities traded on concessional terms. A UMR, which constitutes a specific agreement by an importing country to maintain a minimum level of commercial imports in addition to imports under concessional terms, would be established for any transaction qualifying for prior consultation between governments under the consultative procedures established in 1969,[11] and would ensure that the transaction resulted in "additional" consumption, and did not harmfully affect normal patterns of production and trade. In principle, the UMR established should reflect the traditional commercial imports of the recipient country, but a set of criteria has been established to take into account also its economic position and development needs,[12] so that the UMR should not generally become an undue burden on the recipient country. It has also been agreed that interests of third parties should be fully taken into account.

The procedures for establishing UMRs will form an integral part of the new consultative obligations of countries which adhere to the FAO Principles of Surplus Disposal. During 1970, 27 countries (18 from developed and 9 from developing regions) and the European Economic Community indicated their readiness to adhere to these new rules and 10 exporting countries, compared with only two under the previous set of principles, as well as EEC and the World Food Programme (WFP), reported their transactions to the CCP Consultative Subcommittee on Surplus Disposal (CSD) during the same year. It has been recognized, however, that a number of governments were not yet making the required notifications, and in June 1971 CSD began a review of its current operations.

[11] These have been described in *The state of food and agriculture 1970*. Rome, 1970, p. 23.

[12] For details see *FAO commodity review and outlook 1970-1971*. Rome, 1971.

Mutual adjustment of national policies

The FAO Rice Study Group's decision to confine its action for the present to recommendations to governments on national policies rather than to further any of the varied proposals for international action, while in some ways representing a setback in the move toward better control over international trade, is perhaps indicative of the increasing recognition that mutual adjustment in national policies is necessary if international agreements are to function effectively. In the case of rice, the policies of both developed and developing countries during the past five years had been directed toward expanding production in a situation of acute shortage on world markets. The success of these policies, due both to the development and spread of modern technology and to price policies which provided production incentives, has resulted in a rapid increase in output and a slackening in demand for imports. This situation has prompted exporting countries, particularly developed ones, to resort increasingly to subsidizing their exports and providing them on concessional terms. The resulting disruption of markets, fall in prices, increase in stocks, and loss of export earnings of developing exporting countries has clearly demonstrated the need for international action to coordinate the domestic policies of the countries concerned.

Although the same lesson can be learned from the workings of the other commodity agreements, both successful and unsuccessful ones, countries have not yet recognized the fact that policies can no longer be formulated in an exclusively national or even subregional or regional context, but that serious account must be taken of the national interest of all other countries if an international adjustment is to take place which will permit the orderly functioning of markets to the benefit of all concerned. To develop workable methods for bringing about such an adjustment will not be easy. The necessary first step, that of bringing the problem up for intergovernmental discussion, has however been taken (at the forty-fifth session of CCP), and a secretariat examination of the various avenues possible has also been initiated. The search for solutions will be a major challenge for the community of nations in the coming years.

The most important development during the period under review was the adoption by the United Nations General Assembly in October 1970 of "An International Strategy for the United Nations Second Development Decade." The strategy emphasizes not only economic goals but also social objectives in development and includes, in the area of trade and aid, a number of policy recommendations to both developed and developing countries on trade expansion, economic cooperation and regional integration, and calls for efforts by all countries for expanded mobilization of financial resources for development.

While recognizing that the bulk of the financing of their development must come from the developing countries themselves, who have to take stronger measures for the mobilization of resources, the strategy calls on the developed countries to endeavour to provide by 1972 (and in any case not later than 1975) annual net transfer of resources amounting to at least 1 percent of their GNP. Each economically advanced country is further requested to progressively increase its "official development assistance" to a minimum level of 0.7 percent of its GNP by 1975. With a view to increasing the concessionary element in development assistance, moreover, the donor countries of the Organization for Economic Cooperation and Development (OECD) have been asked to meet the proposal of the Development Assistance Committee (DAC) that by the end of 1971 around 85 percent of aid should have a grant (or concessional) element [13] of over 75 percent; that their aid should progressively become untied, and the harmful effects of present tying be mitigated. The strategy also recommends that financial and technical assistance be placed on a long-term and continuing basis and exclusively at the service of the recipients. All developed countries, including the centrally planned ones, are called on to work toward similar goals and provide for softer terms for their loans, longer periods of grace and maturity and, in deserving cases, rescheduling and refinancing of existing debts.

The proclamation of this strategy implies an expression of the political determination of governments to implement, both bilaterally and multilaterally, a worldwide programme of concerted action. It also brings to culmination the collective efforts carried out for many years by the United Nations system. It signifies an acceptance of many, but not all, of the recommendations made in the major studies of development effort and assistance carried out in 1969 and early 1970, especially those contained in the Pearson report.[14] However, the passing of this resolution does not mean a simultaneous acceptance of all its recommendations for follow-up by the governments of the developed and developing countries, and, for this reason, its implementation by each government is now posing a challenge.

Meanwhile, in spite of increased budgeting of official aid by many donor countries, the stagnation evident in the last few years in the flow of official development assistance has not yet reversed itself. This is almost solely because of the performance of the United States, whose official aid has been steadily decreasing in volume. This decrease has been accentuated by the decline in the amount of food aid which had in the past accounted for over 30 percent of United States aid. The summary picture is presented by the data on the transfer of financial resources put out by OECD for the year 1970/71 (Table I-12). Overall, the value of official development assistance proper, that is the concessional share of development aid, increased by less than 3 percent in 1970.[15] Within this total, the share of bilateral grants and grant-like flows has also declined, reflecting the increasing tendency on the part of the United States to extend food aid in the form of soft loans rather than as grants, and the choice of some other countries to increase the loan content of their aid programmes. In real terms, moreover, the flow of official development assistance actually declined because of rising inflation in the developed countries where most of the aid funds are spent. In 1970, the overall rate of inflation in OECD countries as a whole was 5.75 percent, double the annual average for the decade up to 1968. The consequent decrease in the real value of the aid receipts has been causing considerable concern to the developing countries at a time when their debt-servicing burden is becoming progressively heavier, not only in financial terms but even more so relative to their export earnings, mainly from primary products as the prices of many of these have been falling. A recent study of aid flows to Africa concludes in fact that the net real transfer of resources from developed countries did not increase over the period 1960-67, and probably fell.[16] The situation has not

[13] The grant or concessional element takes account of the maturity, grace period and rate of interest of a loan. It is defined as the face value of the loan, less the discounted present value of required amortization and interest payments (using a 10 percent discount rate).

[14] *Partners in development: report of the Commission on International Development.* New York, Praeger, 1969.

[15] The total official flow increased by some 10 percent, but this reflects an increase of $330 million in net official export credits and of $290 million in portfolio investment, largely by central banks, with multilateral agencies.

[16] Streeten, Paul. *Aid to Africa.* Report prepared for the fifth Joint ECA/OAU Meeting on Trade and Development, Geneva, 13-21 August 1970. E/CN.14/WP.1/30; OAU/TRAD/29, 22 July 1970.

TABLE I-12. – NET FLOW OF FINANCIAL RESOURCES [1] TO DEVELOPING COUNTRIES, 1960-70

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 [2]
	Million U.S. dollars										
Flow from DAC member countries [3]											
OFFICIAL DEVELOPMENT ASSISTANCE [4]											
Bilateral grants	3 716	4 031	4 050	3 972	3 807	3 705	3 737	3 608	3 340	3 262	3 298
Bilateral development loans at concessional terms	452	646	910	1 473	1 761	1 802	1 992	2 292	2 303	2 316	2 400
Contributions to multilateral institutions	535	521	511	368	387	364	341	718	682	1 046	1 115
TOTAL ABOVE	4 703	5 198	5 471	5 812	5 955	5 872	6 070	6 618	6 325	6 625	6 813
OTHER OFFICIAL FLOWS											
Bilateral	195	715	498	206	— 66	297	331	377	735	597	864
Multilateral	67	230	15	— 3	— 7	5	53	19	— 10	— 15	271
TOTAL ABOVE	262	945	513	203	— 73	302	384	396	725	582	1 135
TOTAL OFFICIAL FLOWS	4 965	6 143	5 984	6 015	5 882	6 174	6 454	7 014	7 050	7 207	7 948
PRIVATE FLOWS											
Direct investment	1 767	1 829	1 495	1 603	1 783	2 496	2 187	2 118	2 919	2 703	3 412
Bilateral portfolio	633	614	147	327	416	687	502	796	880	1 386	837
Multilateral portfolio	204	90	239	— 33	141	248	15	306	610	419	343
Export credits	546	573	572	660	860	751	1 124	1 007	1 598	1 964	2 172
TOTAL ABOVE	3 150	3 106	2 453	2 557	3 200	4 182	3 828	4 226	6 008	6 473	[5]7 604
TOTAL OFFICIAL AND PRIVATE	8 115	9 249	8 437	8 572	9 082	10 355	10 283	11 240	13 057	13 680	[5]15 552
Estimated flow from non-DAC countries [6]	135	222	307	388	445	432	353	240	262	252	...
GRAND TOTAL	8 250	9 471	8 744	8 960	9 527	10 787	10 636	11 480	13 319	13 932	...

SOURCE: Organisation for Economic Co-operation and Development.

[1] For DAC member countries, data refer to gross disbursements minus amortization receipts on earlier lending. – [2] Preliminary estimates. – [3] Australia, Austria, Belgium, Canada, Denmark, France, Federal Republic of Germany, Italy, Japan, Netherlands, Norway, Portugal, Sweden, Switzerland, United Kingdom, United States. – [4] Flows which are intended primarily to promote the economic development and welfare of developing countries, and which are intended to be concessional in character. – [5] Including grants by private voluntary agencies. On the same basis as for other years, total private flows would read 6 700, and the figure for total net flow would read 14 731. – [6] Finland, New Zealand, and the centrally planned countries.

improved since then, particularly in view of the decision of the United States Government in August 1971 to cut foreign aid funds by 10 percent, and many developing countries are therefore trying to programme their development with assumptions of reduced dependence on foreign aid.

Within this generally discouraging picture there are some positive elements. First, several member governments of OECD have indicated their acceptance of the aid targets set forth in the Strategy for the Second Development Decade, and some other countries have agreed in principle but have not set a firm date for achieving them. In general, most of the donor countries are increasing their aid flows. Second, at a high level meeting of the Development Assistance Committee of OECD, held in Tokyo in September 1970, a large majority of donor governments declared themselves to be in agreement, for the first time, with the principle of untying development loans, although it is too early to foresee the pace of implementation of these declarations and their impact on level and terms of development assistance.

The period under review has been characterized by attempts by a number of donor governments to streamline their aid machinery and approach. The United Kingdom Government, for example, has abolished the Ministry of Overseas Development and transferred its functions to an Overseas Development Administration attached to the Foreign and Commonwealth Ministry. The Government has yet to make a formal commitment to implement Second Development Decade targets for development assistance.

Following the Presidential Task Force Review of United States Aid Policies (Peterson Report), the United States President presented his proposals for reorganization of foreign aid in a message to the

Congress in mid-September 1970. They would involve a separation of arrangements for security assistance, humanitarian assistance and development assistance, as rapid an increase as possible in the share of development assistance channelled through multilateral institutions, and the provision of remaining bilateral assistance largely within a framework established by international institutions. The latter two approaches were strongly advocated by the Pearson Commission. The Agency for International Development (AID) would be phased out and bilateral assistance channelled through two new and independent institutions to be set up by legislation, namely, a United States International Development Corporation to handle bilateral lending activities, and a United States International Development Institute to bring science and technology to bear on development problems, help build research and training competence in the lower income countries, and offer cooperation in dealing with critical problems such as population and employment. These proposals would result in far-reaching changes in United States organization of and approach to development aid, and have yet to be fully accepted by Congress.

On the multilateral side, over the last couple of years there has been a noticeable increase in the net flow of resources to developing countries, mainly because of larger contributions by developed countries to the soft loan and other funds of the development banks and to the United Nations Development Programme (UNDP). While this is in line with the recommendations of the Pearson Commission, the achievement is far from reaching the recommended doubling of the share of multilateral institutions in the flow of official development assistance. The World Bank and some of the regional banks have more than doubled their lending operations since 1968, but the impact of this expansion on the actual transfer of resources has yet to be felt. Indeed, one of the major problems in this connexion is the stagnation in the flow of disbursements on project aid. This applies as much to the World Bank as to the regional development banks. Faced with this situation, the World Bank is giving serious attention to the supervision of projects with a view to eliminating bottlenecks which have been delaying implementation and consequently the disbursement of effective loans.

Of special importance to agriculture is the level of the soft loan funds of the various development banks, since a relatively large proportion of agricultural projects is financed from these. The third replenishment of the resources of the International Development Association (IDA) falls due for activation in the second half of 1971. A general agreement had been reached among the donor countries on a level of $813 million annually for the next three years, which is more than double its present level, although below that recommended by the Pearson Commission. By October, the replenishment had not yet taken place, largely because of the failure of the United States Congress to pass the necessary legislation. Thirteen countries had, however, either made or stated their intention to make advance contributions even before the replenishment agreement became effective, and at the annual meeting of the World Bank the United States Government indicated that it expected the legislation to be passed before the end of 1971. As regards the soft loan funds of the regional banks, at the end of 1970 the United States Senate reduced the $1 000 million approved by the House for the concessional Loan Fund of the Inter-American Development Bank, and cut out the $100 million which had been requested for the Asian Development Bank. The United States Administration has proposed, however, to revive these requests.

In view of difficulties in implementing the policy of stepping up the flow of soft loan funds of the financing institutions, the World Bank and the Asian Development Bank have been relying largely on borrowing from the market to step up their volume of lending operations. So far they have been successful in this but — because of rising costs of borrowing from capital markets — at the cost of a rising rate of interest which is presently between 7.25 and 7.5 percent.

The multilateral preinvestment assistance provided by UNDP has also recorded some increase, the pledging for 1971 being $240 million against $226 million in 1970. An important development during the period under review has been the reorganization of UNDP following a consensus of the Governing Council. In a number of respects the changes differ from the recommendations of the Jackson Report,[17] but two cardinal points of the report have been accepted, namely a coordinated system of country programming of UNDP assistance for a medium-term period (three years or more), and the pivotal role of the UNDP Resident Representative not only in such programming but also in the sanction of small projects (costing less than $100 000). The UNDP Headquarters setup has been reorganized to provide increased authority and flexibility to the administrator in the exercise of his responsibility and accountability to the UNDP Governing Council. To assist him in his task an independent policy advisory panel has been constituted and the secretariat has been reorganized, including the setting up of four regional bureaux for (*a*) Asia and the Far East, (*b*) Latin America, (*c*) Africa, and (*d*) Europe, the Mediter-

[17] *A study of the capacity of the United Nations development system.* Geneva, United Nations, 1969.

ranean and the Middle East. The important role of the Specialized Agencies in the programming, operations and coordination of UNDP activities has been fully recognized and a number of measures have been initiated for improving the execution of projects. This reorganization came into effect in May 1971.

IBRD and the financing of agriculture

Agriculture continues to be a high priority sector for lending by the International Bank for Reconstruction and Development (IBRD) and IDA. This is reflected not only in the number and amount of loans and credits approved during 1970/71 for projects processed by the Bank's Agriculture Projects Department, but also in the emphasis placed by the Bank on assistance to the agricultural sector in the operational activities of its departments dealing with education, transportation, industries and special projects. In fact, with the increasing importance for agriculture of these latter activities, the statistics of loans and credits approved for projects handled by the Bank's Agriculture Projects Department provide an increasingly incomplete picture, since they exclude, for instance, agricultural credits approved for East Pakistan either under the Cyclone Reconstruction Programme or under the normal action programme of the Special Projects Department; the growing volume of loans and credits given for the development of agricultural education either separately or under general education projects; and loans and credits approved for agricultural feeder roads or fisheries ports under transportation projects, or forest industries under industries projects. Statistics given in Table I-13 which relate solely to the operations of the Agriculture Projects Department of IBRD show only a relatively small increase, from 32 projects totalling $413.7 million in 1969/70 to 35 projects for loans and credits of $419.2 million in 1970/71. The share of IDA credits in these totals has barely increased, from 55 percent in 1969/70 to 57 percent in 1970/71. By mid-1971, however, the resources available to IDA were reported to have been virtually fully committed, and some of the projects scheduled for approval in June had to be postponed pending IDA replenishment.

Aside from the reasons already given, another factor contributing to the small increase is the " slippage " in time of the processing of a certain number of projects. Since these logistical problems will remain, it is important to realize that if the target of quadrupling loans and credits to agriculture during the five-year period 1968/69-1972/73 is to be achieved, at least as large an amount of these will have to be approved during the remaining two years, 1971/72 and 1972/73, as was approved over the last three years.

TABLE I-13. – IBRD LOANS AND IDA CREDITS FOR AGRICULTURE[1] BY PROJECT TYPE : 1969/70-1970/71

	1969/70		1970/71	
	Million U.S. dollars	*Percent of total*	*Million U.S. dollars*	*Percent of total*
Livestock development	55.1	13.4	118.5	28.2
Irrigation development	208.5	50.3	49.5	11.8
Agricultural credit	74.6	18.1	108.1	25.8
Land settlement and development	13.0	3.1	15.4	3.7
Tropical crops	38.0	8.0	34.4	8.2
Forestry	11.1	2.7	—	—
Fishery	1.3	0.3	3.5	0.8
Other general agricultural development	12.1	4.1	89.8	21.4
TOTAL AGRICULTURE	413.7	100.0	419.2	100.0
Number of projects	32		35	

[1] Data relate to loans and credits approved in each fiscal year for projects handled by the Agriculture Projects Department of IBRD.

This is not an impossible task, but will require concerted efforts on the part of IBRD and, through its Cooperative Programme, FAO, in respect of identification, preparation and appraisal of projects.

Among the types of projects approved in 1970/71, there have been striking increases in both the number and the amount of loans and credits for livestock and general agricultural development. The overwhelming proportion of livestock loans are for projects in Central and South America, whereas in general agriculture the geographic coverage is rather wider. An important feature of the latter is that they include projects in many relatively new fields, such as the production and processing of cereal seeds, storage and processing of grains, agro-aviation, fruit and vegetable production, and agricultural research. On the other hand, there has been a very sharp fall both in the number and the amount of loans and credits approved for irrigation projects. This may reflect only delay and slippage in project processing. Otherwise, more attention will need to be given to strengthening the project pipeline for irrigation development, the importance of which in the 1970s has so strongly emerged from FAO's Indicative World Plan for Agricultural Development.

With a view to formulating and appraising projects and development programmes on a systematic basis for countries with critical problems, as well as in some new areas, a Special Projects Department was organized in 1970. With the creation of this Department came the acceptance of the concept of pioneer projects which FAO had been advocating for many years for development in the Mekong basin. These, in contrast to small-scale pilot projects, aim at identifying the technical and economic problems

over larger areas in order to provide a sound basis for investment. Pioneer projects financed by UNDP, with the Bank as its executing agency, are to be undertaken in Laos, the Khmer Republic, the Republic of Viet-Nam, and northeast Thailand.

In the field of education, which is another priority sector for Bank lending and closely related to the present policy of recognizing the human factor in development, there has been a considerable increase in Bank operations which has both a direct and indirect impact on the agricultural sector. Over the last two years education projects have increasingly taken into account the need for vocational education in agriculture and the training of intermediate level agricultural technicians. In addition, a special development in 1970/71 has been the identification and formulation of a certain number of projects dealing with higher education and training in agriculture at the university level.

Regional development banks

In 1970 the Inter-American Development Bank (IDB) authorized 59 loans with a total loan commitment of $644 million, the highest ever, compared to $632 million the previous year. The Bank's total loan portfolio at the end of 1970 exceeded $4 000 million, of which approximately one third has been provided on conventional loans and two thirds on soft terms from its fund for special operations. In 1970 the Bank took steps to increase its funds by authorizing an increase in its ordinary capital from $1 000 million to $2 000 million, and providing for an expansion of $1 500 million in its Fund for Special Operations. Agriculture continued as the leading sector in the lending programme of the Bank with commitments of $236 million for 13 projects, some of which were prepared under the IBRD/FAO Cooperative Programme. Total sector credits have now reached $1 067 million, or 26 percent of the total portfolio. An interesting instance of the Bank's emphasis on agricultural development are the grants of $300 000 each given through its Technical Assistance Programme to the International Maize and Wheat Centre in Mexico, and the International Centre in Tropical Agriculture near Cali, Colombia, to train professional agriculturists in the new techniques associated with the use of high-yielding varieties of cereals.

The African Development Bank (AFDB), with a membership of 32 African states and a paid-up capital of $66 million, had approved by April 1971 a total of 22 projects in which the Bank's commitments amounted to $37.1 million. A sectoral breakdown indicates that commitments to agricultural projects were the highest at $9.3 million, or 25 percent of the total, followed by transport ($7.3 million or 20 percent), and power ($7.3 million or 20 percent). The total cost of the six agricultural sector projects, including other than AFDB's commitments, is $22 million. Disbursements on account of these projects, however, amounted to only $1.4 million, principally because five of them, all prepared under the FAO/AFDB Cooperative Arrangement, were approved only in March 1971.

Since attempts by the Bank to stimulate development at a faster rate than in the past have been hampered by its conventional lending terms, that is, 7 percent with negotiable loan and grace periods, efforts have been intensified to establish the African Development Fund, which would provide loans to Bank members on concessional terms. A number of potential donor countries have indicated their willingness to contribute toward such a fund. As a further measure, to add to the available resources, the AFDB took the initiative in examining the possibility of mobilizing private capital for African development through the establishment of a private multinational finance company, similar to those already operating in Latin America and Asia. It has now been decided to set up the International Finance Corporation for Investment and Development in Africa (SIFIDA) with an authorized capital of $50 million and a paid-up capital of $12.5 million. The shareholders of this Corporation consist of the major developed countries, the International Finance Corporation and AFDB.

There was a considerable increase in the activities of the Asian Development Bank (ADB) in 1970. Thirty-two loans for $246 million, of which 10 amounting to $34 million were from special funds, were approved during the year, as compared to 20 loans amounting to $98 million in 1969. Sectorwise, transportation received 26 percent of the total, followed by public utilities at 23 percent. Agriculture received 14 percent, which is more favourable than it sounds since the Asian Development Bank finances only the foreign exchange cost of projects. A number of projects in the agricultural sector were prepared with the assistance of FAO personnel provided under the ADB/FAO Cooperative Arrangement. Since its establishment, ADB has granted 59 loans amounting to $385 million spread over 15 countries. Some of the highlights of its operations during the year were the successful flotation of its bonds in some important capital markets; approval of loans to the Khmer Republic, Laos and the Republic of Viet-Nam, which were the first loans received by these countries from an international financing agency; an expansion of its project lending to new fields such as vocational education and agricultural credit; and the preparation of the study *Southeast Asia's economy in the 1970s*. The expansion of its lending activities, associated with the increase in the ab-

sorptive capacity of its developing member countries, has made it necessary for the Bank to consider an increase in its capital resources, since loan commitments by ADB now amount to a large proportion of its ordinary capital resources (excluding special funds). A comprehensive study on the most acceptable method of increasing its capital resources is being undertaken.

An innovation introduced by ADB in 1970 involves the blending of loan conditions so that some components of a project are financed on conventional and others on concessional terms. Such a mixture enables ADB to reduce the overall interest rate for a project as a whole below the conventional $7^{7}/_{8}$ percent, and yet entails a relatively limited use of the not too abundant special fund resources for lending on concessional terms. This development is of particular interest since many developing countries are reluctant to add to their already heavy debt burden by accepting loans which carry conventional rates of interest.

Food aid

Food aid transactions, as notified by governments to the Consultative Subcommittee on Surplus Disposal and documented by the new FAO Central Information Service on Food Aid, are estimated to have declined slightly in 1970, reflecting mainly a 6 percent reduction in United States shipments on concessional terms (see p. 61).

In terms of individual commodities, the largest share continued to be in the form of cereals — 8.9 million tons of wheat and/or wheat flour, 1.9 million tons of rice and 0.8 million tons of coarse grains — and the remainder principally in dairy products (43 000 tons) and soybean and/or cottonseed oil (298 000 tons). Although comparable data is not available for 1969, in the case of the United States (by far the largest single donor country) concessional shipments of wheat and wheat flour were expanded in 1970 by about 10 percent, while those of rice, feedgrains, dairy products, oilseeds and oilseed products were all smaller.

Disbursements from the UN/FAO World Food Programme (WFP) amounted to some $144 million, an increase of about 70 percent over the $84 million disbursed in 1969. Commitments, on the other hand, were reduced sharply — to $196.5 million from $333.2 million in 1969 — and there was a further reduction in 1971.[18] Thus despite the continued growth in needs and requests for WFP aid, the Programme has been obliged to reduce its commitments for lack of sufficient resources. A contributing factor has probably been the diminution of surplus stocks in developed countries and their diversion to uses other than food aid.

In part, WFP shipments were provided from contributions received under the Food Aid Convention (FAC) of the 1967 International Grains Arrangement which in 1971 was renegotiated as part of the new International Wheat Agreement (see p. 23). Under the 1971 FAC, the signatories (which include all the countries which participated in the previous Convention except Denmark, Norway and the United Kingdom) have undertaken to contribute specified quantities of wheat, coarse grains or grain products (or their cash equivalent) as food aid. The total agreed upon — 4 million tons — is a little less than that which a slightly larger number of participating countries contributed under the 1967 FAC. The terms on which the food aid may be provided have been changed under the new Convention. Previously, only gifts or sales in the currency of the importing country were defined as food aid. In the new FAC, sales on long-term credit (with repayment covering 20 years or more and at interest below commercial rates) are also considered as food aid transactions.

[18] See *Annual statement of the Executive Director on the development of the Programme*. Addendum. WFP/IGC: 19/4 Add. 1 Table IX-B.

Agricultural production requisites

With the accelerated progress in agricultural technology in a number of developing countries, increasing attention is being paid to the use of production requisites, such as fertilizers, pesticides, improved seeds and various farm machinery, including pumping sets and tubewells. Reasonably consistent statistics exist only for improved seeds, fertilizers and tractors. Progress in the use of high-yielding cereal varieties is described in the various regional reviews in Chapter II. The paragraphs below deal with progress made in fertilizer production and consumption, and in the use of tractors.

Fertilizers

Preliminary data indicate that the growth of world consumption of commercial fertilizers, which had decelerated in 1968/69, slowed down somewhat more in 1969/70 (see Table I-14). At 63.0 million tons (NPK, in terms of nutrient content), it exceeded that of the previous year by 6 percent, compared with an increase of 8 percent in 1968/69, and an average rate of increase of some 10 percent in the four preceding years. Total consumption in the developed market economy countries again increased at the

TABLE I-14. – WORLD AND REGIONAL CONSUMPTION AND PRODUCTION OF COMMERCIAL FERTILIZERS,[1] 1952/53-1956/57 AVERAGE, 1968/69 AND 1969/70

	Consumption [2]			Consumption per hectare of arable land, 1969/70	Production		
	1952/53-1956/57 average	1968/69	1969/70		1952/53-1956/57 average	1968/69	1969/70
	..... *Million metric tons*			*Kilogrammes*	..... *Million metric tons*		
DEVELOPED REGIONS							
Western Europe	7.5	15.6	16.3	162	8.5	18.9	18.7
North America	5.9	14.8	15.3	70	5.9	18.1	19.2
Oceania	0.7	1.6	1.6	32	0.6	1.3	1.3
Japan	1.1	2.3	2.3	410	1.0	2.9	2.9
TOTAL [3]	15.4	34.8	36.1	94	16.1	42.0	43.1
DEVELOPING REGIONS							
Latin America	0.5	2.4	2.6	21	0.4	0.9	1.0
Far East [4]	0.6	4.0	4.4	13	0.1	1.7	2.1
Near East [5]	0.2	1.0	1.0	[6]25	—	0.4	0.4
Africa [7]	0.1	0.5	0.6	3	0.1	0.4	0.5
TOTAL	1.4	7.9	8.6	12	0.6	3.4	4.0
Eastern Europe and U.S.S.R.	3.4	14.0	15.2	54	4.0	15.7	17.0
China (mainland)	—	2.8	3.2	29	—	1.5	1.7
WORLD TOTAL	20.2	59.5	63.0	44	20.7	62.6	65.8

[1] In terms of nutrient content (N, P_2O_5 and K_2O). – [2] Consumption figures are not accurate, since in the case of many countries they refer either to "apparent consumption" or to distribution from factories and ports. – [3] Including Israel, South Africa and Kuwait. – [4] Excluding Japan. – [5] Excluding Israel and Kuwait. – [6] Consumption is calculated per hectare of cropped area, to take account of extensive multiple cropping in the United Arab Republic and fallow in other Near East countries. Consumption per hectare of arable land would be only 13 kilogrammes. – [7] Excluding South Africa.

relatively slow rate of 3.5 percent — compared with nearly 7 percent a year in the 1960s — and the increase in eastern Europe and the U.S.S.R. slowed down. The data for the developing countries are less reliable, since in many cases they refer not to actual consumption but to distribution from ports and factories, and little information is available on stocks. Such as they are, these data suggest an overall increase of some 11 percent, compared with 17 percent the year before.

In broad terms, the slower growth of fertilizer consumption in the developed market economy countries may be associated with their unchanged level of agricultural production since 1968. With few exceptions, the largest increases took place in the technically least advanced countries of western Europe and, despite the moderate slowdown, in most countries of eastern Europe (except Bulgaria) and in the U.S.S.R.

Among developing countries there were a number for which the available data indicated a reduction in the apparent consumption in 1969/70. In Latin America, reduced consumption in Ecuador and Venezuela was mainly responsible for the much smaller increase in the region. In the Near East, where consumption hitherto had risen rapidly, the data indicate virtually no increase in 1969/70, reflecting an absolute decline in the United Arab Republic, the Sudan and Syria, and a slowing down of the rate of increase in Turkey from 36 to 17 percent. In Africa, the growth of consumption accelerated mainly because of better weather in the Maghreb countries and east Africa.

In the developing countries of the Far East, fertilizer consumption continued to increase rapidly. In India there has been some slowing down from the very rapid increases (of the order of 40 percent a year) in 1965/66-1967/68, but at 13 percent the increase in 1969/70 was still substantial, despite various problems in the area of financing, storage and marketing, and a 10 percent levy on fertilizers which was imposed in March 1969. In Pakistan, the growth of consumption accelerated from 7 percent in 1968/69 to 19 percent in 1969/70. For Indonesia, the available data show a decline of almost 18 percent, compared with an increase of over 100 percent the year before. In fact some decline in fertilizer consumption, or at least a reduced rate of growth, appears

likely in view of the termination of the Gotong Royo BIMAS scheme which included arrangements for the provision on a large scale of fertilizers and other production requisites to rice farmers. However, as in India, there were large stocks of fertilizers throughout Indonesia and both the recorded increase and the subsequent decline of fertilizer use may not truly reflect the actual situation.

World production of fertilizers rose by 5.1 percent to 65.8 million tons and thus exceeded consumption by 2.8 million tons (Table I-14). Output continued to increase in eastern Europe and the U.S.S.R. and in North America, but showed a small decline in western Europe and was almost stationary in Japan. Industries in developed market economy countries were functioning below capacity and experiencing marketing difficulties. These conditions are expected to continue for the next three to four years for nitrogen and phosphorus, and somewhat longer for potassium. Despite the continued rapid increase of production in the centrally planned economies deliveries to farmers have, on the whole, remained below target, and though there was some trade, particularly in phosphates, the gap was not made up by imports from other areas. Of the developing regions the Far East, with 400 000 tons, had the largest production increase, mainly in India and Pakistan. Although the rate of increase in these regions had slowed down, output was still a quarter more than in 1968/69. Even so, most developing countries remain net importers of fertilizer, and as a group they import about half their total supplies. No great change is expected in this ratio in the near future, because of various obstacles to manufacturing growth. The capital cost of new plant is large and has a high foreign exchange content (of about 60 percent). Foreign exchange shortages are a constraint also in countries where domestic raw material for fertilizer manufacture is unavailable or insufficient. Moreover, production costs are high and returns low because plant capacity is often underutilized for a variety of reasons, including shortage of raw materials, interruption of power supplies, and shortages in skilled manpower and managerial staff. For these reasons it is often difficult to attract or justify investment in the industry, particularly because of the large minimum size of modern plants. Partly in an effort to overcome some of these problems, there is an increasing tendency to import intermediate products for further processing into fertilizers, and trade in such intermediate products is expected to grow.

For the above reasons, as well as high transport costs, fertilizers generally remain expensive to farmers in developing countries. In the last few years, however, prices in the main exporting, as well as in a number of developing importing, countries have moved downward due to the anxiety of industries in exporting countries to dispose of their excess supplies, and to the slack in demand in many importing countries. Among countries for which data are available, lower fertilizer prices in 1969/70 are reported by Argentina, Burma, Ceylon, China (Taiwan), Iraq, Ivory Coast, the Khmer Republic, Syria and Turkey. Moreover, a number of countries in recent years have taken measures to make fertilizers cheaper for their farmers. The subsidy on fertilizers in Ceylon was increased in 1966/67 and Ghana trebled its subsidy in 1968/69; in West Pakistan, subsidies on main fertilizers were doubled during 1966/67-1968/69, and in Uruguay subsidies on ammonium sulphate, urea and superphosphate increased tenfold from 1964/65 to 1969.[19] Indonesia started in April 1970 to subsidize urea and triple superphosphate to about 50 percent of the price, and in the Khmer Republic subsidies amounting to one third of the price continue to be paid. Higher prices for farm produce in several countries, because of shortages in 1965 and 1966, also encouraged farmers to use more fertilizer, and the simultaneous introduction of high-yielding varieties of cereals in some countries made greater utilization an essential part of the production process. The resulting supply increases have since reduced product prices in many countries, at least in relative terms, and this has apparently reduced incentive to use more fertilizer in spite of a favourable cost/revenue ratio, particularly in the cultivation of high-yielding and improved varieties of grains which respond to increasing fertilizer input up to relatively high yield levels. Some governments have resorted, therefore, to introducing or increasing subsidies as an inducement to farmers to use more fertilizers.

Farm machinery

Very important changes are taking place in agriculture today in the field of mechanization; however, international comparisons remain difficult because of the lack of detailed statistics on the various types of machinery, their characteristics, and intensity of use. The indicator most commonly available is the number of tractors, and while this may serve as a rough indication of the general level of mechanization of agricultural production, international comparisons must be made with caution, and can have only limited validity.

As shown in Table I-15, the number of tractors used in world agriculture rose from 10.9 million in 1960 to 15.2 million in 1969, equal to an average annual growth rate of 4 percent. At the end of the 1960s

[19] This was partly due to inflation in the country and devaluation of the peso.

TABLE I-15. – TRACTORS USED IN AGRICULTURE, 1960-69

	1960	1965	1966	1967	1968	1969	Per 1 000 hectares arable land. 1969
	Thousands						*Number*
DEVELOPED REGIONS							
Western Europe	3 093	4 344	4 560	4 759	4 969	5 206	51.4
North America	5 265	5 387	5 413	5 431	5 428	5 415	24.6
Oceania	337	395	409	421	423	428	9.1
Other [1]	129	236	256	280	358	396	21.9
TOTAL	8 824	10 362	10 638	10 891	11 178	11 445	29.6
DEVELOPING REGIONS							
Latin America	355	507	537	566	597	625	4.9
Far East [2]	56	97	107	114	121	129	0.5
Near East [3]	76	111	127	140	157	173	2.3
Africa [4]	84	98	105	112	117	122	0.7
TOTAL	571	813	876	932	992	1 049	1.6
Eastern Europe and U.S.S.R.	1 444	2 178	2 264	2 372	2 488	2 609	9.3
China (mainland)	52	88	95	98	101	105	1.0
WORLD TOTAL	10 891	13 441	13 873	14 293	14 759	15 208	10.6

[1] Japan, Israel and South Africa. – [2] Excluding Japan. – [3] Excluding Israel. – [4] Excluding South Africa.

the developed market economies and eastern Europe and the U.S.S.R. combined still accounted for over 90 percent of the total, even though the number of tractors in developing countries had nearly doubled.[20]

Among the developing regions, mechanization of agriculture had its earliest start in Latin America, which still has the largest number of tractors. The reasons for this vary from country to country in the region. An important one, no doubt, is the existence of large, modern commercial farms and plantations raising export crops. Others include a relatively favourable topography for mechanical cultivation in several countries; government-sponsored credit policies favouring mechanization; exchange rates favouring imports; and shortage of labour in certain areas. The recent increase in mechanization has, however, been fastest in the Far East and Near East regions, where the number of tractors more than doubled over this period, with particularly rapid growth in the first half of the 1960s. In part the increase reflects the initiation in the early part of the decade of a number of farm mechanization schemes in these regions by means of government-operated tractor stations, or government assistance to private contracting services. However, a number of government-sponsored tractor schemes have been found uneconomical. In some cases more than 30 percent of the total fleet has remained out of use for six months or even a year, due to lack of spare parts and absence of maintenance and servicing facilities.

The limited data available indicate that farm mechanization in developing countries has so far taken place on a rather selective basis. For instance, in India the number of tractors has increased considerably in the states of Punjab and Haryana, which have the smallest proportion of landless labour (6 percent), and where demand for agricultural labour has increased at a time when the rural labour force as a whole seems to be declining due to migration to the many middle-sized towns which have grown up recently. As a result, the average daily farm wage in these areas has nearly doubled since 1964, and the bigger farmers have responded by substituting more capital-intensive techniques in critical activities. The trend has been the same in some areas of West Pakistan, where labour for sowing and harvesting operations has not been sufficient. High wages during peak seasons are reported to have promoted mechanization in Morocco also. Double cropping, which was uneconomic without mechanical power, has been facilitated by the use of tractors on large farms. In such circumstances direct displacement of labour does not necessarily take place. In some areas in fact more intensive farming, particu-

[20] It is doubtful, however, that the figures on the number of tractors in use in the developing countries take full account of machines which have become obsolete or are out of order.

larly since the introduction of high-yielding varieties of cereals, has led to increased farm employment, and additionally to employment in industries manufacturing, assembling and servicing the tractors.

In some developing countries, although the number of tractors and other farm machinery in use has grown rapidly, supplies have remained inadequate. This, in the context of general policies of industrialization replacing imports, has led to increases in local production. Annual production in 1970 in all developing countries combined was estimated at from 55 000 to 60 000 units, compared with 30 000 in 1964. To stimulate output, the wheeled tractor and power tiller industries in India were exempted from licensing provisions in 1968. Since then, approval has been given to seven projects for the manufacture of agricultural tractors in the 14 to 75 hp range, and two schemes for power tillers, with a total capacity of 56 000 tractors and 25 000 tillers, compared with the estimated production of 18 000 tractors in 1969. The number of countries where tractors are manufactured or assembled is increasing gradually, in several cases as a result of agreement with foreign firms for complete or partial local manufacture or assembly. In some countries industries capable of manufacturing tractor components and tractor-drawn equipment and implements have also been set up.

In many situations, however, there is at least a short-run conflict between the gains that can be had through mechanization and its negative impact on employment. A number of countries, especially in Africa, are therefore examining ways of introducing mechanized and other more capital-intensive techniques that are consonant with their employment objectives. There is a need for similar studies in other countries as well. The number of tractors per 1 000 hectares of arable land is low in the developing regions, and while it is neither feasible nor economically or socially desirable for developing countries to attain anything like the degree of mechanization prevailing in developed regions, further mechanization is essential in those countries where there are limited possibilities of draught animals providing adequate farm power. At present, power available per hectare from all sources — human, animal and mechanical — in these countries is far less than the minimum required for achieving optimum yields. In a recent study, the available power per hectare was put at 0.05 hp for Africa, 0.19 hp for Asia, and 0.27 hp for Latin America, against a requirement of 0.5 to 0.8 hp per hectare [21] — and this before the widespread use of high-yielding cereal varieties lifted the level of technology and increased the power requirement. The Indicative World Plan for Agricultural Development, which takes into account the new technology represented by high-yielding varieties and other relevant factors, has proposed a growth rate for tractor use of 7 percent per year over the period 1965-85 for the developing regions as a whole, with the fastest rate of growth proposed for Asia (13 percent), followed by the Near East (6.2 percent), Africa (4.8 percent), Latin America (3.9 percent), and North Africa (3 percent). If achieved, the number of tractors in Asia in 1985 would still not much exceed 1 million, and in Africa the number would still be below 300 000, this within an overall increase to about 3 million for all developing regions combined, compared with 1 million in 1969.

[21] *Report of the President's Science Advisory Committee.* Washington, D.C., The White House, May 1967. Vol. 2, p. 397.

Medium-term forecasts for cereals

In line with the decision of the FAO Conference at its fifteenth session in November 1969, the country coverage of the medium-term forecasts of production, consumption and net trade in cereals has been further expanded. The 19 countries covered this year account for 69 percent of cereal production in the developing market economy countries, and 45 percent of their cereal imports. The best coverage is again for the developing Far East (79 percent of production and 66 percent of imports), mainly because of the predominant position of India and Pakistan in the regional total.

The results of the latest forecast, running to 1974, are presented in summary form in Table I-16. As originally explained (in *The state of food and agriculture 1969*), the forecasts represent an informed judgement based on recent trends in yields, area, production and consumption, and the factors which affect them in the forecast period — particularly the national policies affecting production and trade, the progress recorded with current government programmes concerning cereals, and the outlook for international markets. In assessing their significance it is necessary to keep in mind the various limitations of the exercise — including the inadequacy of many of the basic data — and the uncertainty of forecasting output which is subject to many unpredictable influences such as weather, particularly in semiarid

areas with limited irrigation, as north Africa. In particular, trade forecasts are subject to considerable uncertainty as even small deviations in forecast production and consumption levels could alter the trade picture significantly. This is especially so for those countries very close to self-sufficiency.

The evidence on recent performance and the forecasts to 1974 presented in Table I-16 are broadly in line with earlier medium- and long-term expectations, as presented in FAO's Indicative World Plan for Agricultural Development (see *The state of food and agriculture 1969*, p. 30), and in medium-term forecasts presented in previous issues of this report. They point toward an increasing degree of self-sufficiency in cereals in a number of developing countries, although many will still remain substantial importers. In the international rice markets, in fact, many events forecast in the recent past have already materialized, as discussed above (p. 10): as a result of diminishing import needs in a number of developing countries, and inadequate short-term adjustment of supplies, prices and export earnings of several developing exporters have fallen, while developed exporters have put increasing reliance on subsidization of exports and concessional sales.

As already pointed out, recent progress in produc-

TABLE I-16. – MEDIUM-TERM (1974) FORECAST FOR CEREAL PRODUCTION, UTILIZATION AND NET TRADE IN SELECTED DEVELOPING COUNTRIES

	Production			Apparent domestic utilization			Net trade		
	Actual		Forecast	Actual		Forecast	Actual		Forecast
	1965-67 average	1970 (preliminary)	1974	1965-67 average	1970 (preliminary)	1974	1965-67 average	1970 (preliminary)	1974
	Thousand metric tons								
Net importers									
FAR EAST									
Ceylon	680	1 064	1 364	1 634	2 054	2 034	+ 954	+ 990	+ 670
China (Taiwan)	2 244	2 295	2 410	2 456	3 529	3 696	+ 212	+ 1 234	+ 1 286
India	68 627	91 309	109 400	77 582	94 454	110 000	+ 8 955	+ 3 145	+ 600
Korea, Republic of	5 937	6 788	7 624	6 598	8 764	9 964	+ 661	+ 1 976	+ 2 340
Malaysia (West)	881	933	1 320	1 532	1 655	1 684	+ 651	+ 722	+ 364
Pakistan	17 557	22 814	26 072	19 025	24 500	26 530	+ 1 468	+ 1 686	+ 458
TOTAL COUNTRIES LISTED	95 926	125 203	148 190	108 827	134 956	153 908	+ 12 901	+ 9 753	+ 5 718
NEAR EAST									
Iran	5 168	6 358	7 245	5 426	6 707	7 385	+ 258	+ 349	+ 140
Iraq	1 892	2 152	2 940	1 926	2 265	3 190	+ 34	+ 113	+ 250
United Arab Republic	5 782	6 642	8 210	7 908	7 293	9 610	+ 2 126	+ 651	+ 1 400
TOTAL COUNTRIES LISTED	12 842	15 152	18 395	15 260	16 265	20 185	+ 2 418	+ 1 113	+ 1 790
LATIN AMERICA									
Brazil	17 355	21 993	23 855	18 958	22 307	23 250	+ 1 603	+ 314	— 605
Chile	1 789	1 771	2 357	2 195	2 251	2 750	+ 406	+ 480	+ 393
TOTAL COUNTRIES LISTED	19 144	23 764	26 212	21 153	24 558	26 000	+ 2 009	+ 794	— 212
AFRICA									
Algeria	1 383	1 598	2 172	1 920	2 057	2 735	+ 537	+ 459	+ 563
Ghana	527	487	573	638	624	689	+ 111	+ 137	+ 116
Morocco	2 779	4 301	4 519	3 354	4 287	4 902	+ 575	— 14	+ 383
Senegal	663	672	952	898	951	1 342	+ 235	+ 279	+ 390
Tunisia	524	655	515	786	1 228	1 202	+ 262	+ 573	+ 687
TOTAL COUNTRIES LISTED	5 876	7 713	8 731	7 596	9 147	10 870	+ 1 720	+ 1 434	+ 2 139
GRAND TOTAL	133 788	171 832	201 528	152 836	184 926	210 963	+ 19 048	+ 13 094	+ 9 435
Net exporters									
Argentina	16 781	19 166	25 750	7 407	9 287	13 285	— 9 374	— 9 879	— 12 465
Mexico	12 276	14 150	17 780	10 727	13 366	16 480	— 1 549	— 784	— 1 300
Thailand	8 713	10 368	12 215	6 020	7 828	8 605	— 2 693	— 2 540	— 3 610
TOTAL COUNTRIES LISTED	37 770	43 684	55 745	24 154	30 481	38 370	— 13 616	— 13 203	— 17 375

tion has been particularly striking in the cereal-deficit countries of the Far East, even though the base period (1965-67) for this year's forecast is unrepresentative for the region in that it includes the two years, 1965 and 1966, when widespread monsoon failure reduced cereal output in several countries. Equally striking is the forecast of a further reduction in these countries' reliance on imports. Overall, the cereal imports of the Far East countries shown are expected to fall between 1970 and 1974 by almost half, with the largest reduction, both absolutely (3.8 million tons), and in relative terms (by over 50 percent), in wheat. By 1974 cereal imports of the six countries shown would account for only some 3 percent of their total utilization, compared with 13 percent in the admittedly exceptional years from 1965 to 1967, and 7 percent in 1970, when imports into some countries of the region were raised by unforeseen natural calamities and other factors. India, the largest importer in the region, would be virtually self-sufficient in foodgrains by 1974 as the net imports forecast for that year — somewhat over half a million tons — would account for only a negligible share of total foodgrain consumption. In practical terms, this implies that India's foodgrain production could exceed domestic needs in years of bumper crops but still fall short of requirements if harvests are below average.

Pakistan's net cereal imports in 1974 are forecast at half a million tons, because paddy production in East Pakistan may rise more slowly than had been expected. The imports will be mostly of rice, which is the preferred cereal and currently in ample supply in world markets at low prices.

Steep reductions are forecast in the net import of cereals by Ceylon and West Malaysia. Rice production is continuing to increase in both countries and is forecast to cover all but about 5 percent of their domestic needs (compared with 44 and 23 percent, respectively, in 1965-67) while wheat utilization may decline as consumers shift to rice, the preferred cereal, as incomes rise and availability improves. Net cereal imports into China (Taiwan) are forecast to rise further, although at a lower rate than in recent years. Export availability of rice from the country is forecast to increase moderately, but with continuing difficulties in finding export markets it is likely that some of the surplus may be used as cattle feed, thereby reducing the forecast import requirements of feedgrains. The Republic of Korea is another country in the Far East whose cereal import requirements are forecast to increase in 1974.

In strong contrast to most of the Far Eastern developing countries shown, the net imports of cereals into the majority of countries in other developing regions are forecast to remain unchanged at the 1970 level or to increase. The outstanding exception is Brazil, which is expected to turn from a net cereal importer to a net exporter, mainly because of a further steep increase in its exports of maize. Chile, too, is expected to reduce its dependence on imports, particularly in respect of wheat. In all other net importing countries shown in the table (including the Republic of Korea and China [Taiwan] in the Far East) net imports are expected to remain constant at the 1970 level or to increase.

This finding — which is in line with recent trends in production, as discussed above and in Chapter II — would seem to reflect two circumstances of a general nature. First, many countries are finding it difficult to expand the cultivation of the various cereals as rapidly as they might wish, either because of shortage of suitable land and competition for it by noncereal crops, or because of difficulties in launching and implementing yield-raising programmes. In Algeria, for example, it is planned to shift some marginal wheat land to other crops for pasture and, although an increase in yields and output is forecast, some growth in wheat imports is expected. In Morocco, efforts are being made to introduce high-yielding varieties of wheat, but since progress is slow and there are limited possibilities for expanding the rainfed cereal area, only a small increase in output of wheat and barley is forecast and imports, which were small in 1970, are expected to revert toward earlier levels. In Senegal, wheat consumption continues to grow rapidly, as does that of rice, and although efforts to accelerate the production of rice, millet and sorghum (the main cereals) continue, rice and wheat imports are expected to be still necessary. In the United Arab Republic, the reversal in the fall of net cereal imports mainly reflects the limited possibility of expanding wheat area in view of established crop rotation schemes and the decision of the Government not to grow any cereals in the "new land," that is, land newly irrigated by the High Dam.

Second, in a great number of countries a rapid increase in demand for coarse grains is forecast for livestock feed and, to a lesser extent, beer brewing. In some countries, including the United Arab Republic, Ghana and Senegal, domestic production is expected to rise sufficiently rapidly to accommodate this increase. In others, including China (Taiwan), the Republic of Korea, Iran and Iraq, an increase in coarse grain imports is forecast.

The increasing demand for coarse grains as livestock feed is also a major factor influencing the prospective cereal trade of the net exporting countries covered by the forecasts. In the case of Argentina, about two thirds of the forecast increase in net cereal exports is for maize and sorghum, despite a rise also in domestic consumption. Wheat exports are expected to grow little by comparison,

reflecting the relatively less promising prospects for world trade in wheat compared to coarse grains which are affecting government policies and farmers' planting decisions. Mexico, too, is expected to increase its maize shipments substantially. Another country which is forecast to ship greatly increased quantities of coarse grains is Brazil, where maize production growth has recently surpassed targets, and use of improved technology is spreading. In Thailand, where maize exports already exceed those of rice, all the increase in net cereal exports is forecast to be in maize, while those of rice are expected to remain at the current level of about 1 million tons. The stagnation in Thailand's rice exports is a reflection of the increasing competition, limited outlets and falling prices in world rice trade in recent years. Overall, no increase over the current below-average level of exports is forecast for the five net rice exporters covered (Argentina, Brazil, China [Taiwan], Thailand and the United Arab Republic).

Chapter II. - REVIEW BY REGIONS

Western Europe

Because of a reduction in industrial production and diminishing exports, the growth of gross domestic product (GDP) in western Europe (at constant prices) decreased from 6 percent in 1969 to 4.7 percent in 1970. The slowdown was felt in almost all the industrial countries of the region except Italy, where there was some acceleration from 1969, and the United Kingdom, where expansion remained, however, very small. The factors mainly stimulating growth were domestic consumption and investment in machinery and transport equipment.

Notwithstanding slower economic expansion, employment continued to rise at the same rate as in the previous year. This contributed to the inflationary pressures, which were particularly heavy and widespread during the year under review. Consumer prices were typically about 5 to 6 percent higher than in 1969. These developments strongly affected the agricultural sector, since they worsened its terms of trade with other sectors and widened the disparity of incomes between farmers and other occupational groups.

A further slowdown in economic activity was evident in 1971. The principal stimulating factor continued to be private consumption, but because of postponed investments, weaker trade, and anti-inflationary policies, the gross national product (GNP) of the industrial countries is not expected to grow by more than 4 percent.

Agricultural production

Owing in part to unfavourable weather, in part to policies to discourage output of wheat and dairy products, agricultural production in the region remained stationary in 1970 for the second consecutive year (Table II-1).

Inadequate rain affected crop production in some countries, and the resulting shortage of animal feed led to higher livestock slaughterings. This was the case in Yugoslavia, and also in Spain where cereals, citrus fruit and livestock were particularly affected. At the other extreme, a number of countries had unusually large increases in output. These include Sweden, where production recovered after a poor year in 1969; the Netherlands, where exports continue to support production growth; and Greece, where the recovery in the production of cereals, tobacco and olive oil continued. There was little or no change in output in a number of major producing countries, including France, the Federal Republic of Germany, and Italy.

Cereal production fell in most western European countries. Total wheat production was down by 5 percent, to 48 million tons. Production in EEC was lower despite a large crop in Italy, and this brought about the elimination of surplus stocks of soft wheat. Policy measures to restrict output were in part responsible, but the main cause was probably unfavourable weather. Improved weather, on the other hand, was largely responsible for larger wheat harvests in Greece, Portugal and the United Kingdom. Other cereals crops also suffered from bad weather in several countries and total regional production declined by about 5 percent. Production of rye continued to decline in the Federal Republic of Germany, the principal producer. Contrary to the trend, barley crops were smaller in a number of countries, but the production of maize, which is gaining in importance as a feedgrain, rose by a further 7 percent as a 30 percent increase in France more than offset reductions elsewhere.

Sugar-beet production in EEC fell by 4 percent. Poor weather reduced yields in Belgium and the Netherlands, and in Italy the area was smaller as sugar beet has become less profitable than some other crops, despite Community support. As a result, stocks held by EEC countries were expected to fall from 1.3 million tons at the end of 1969/70 to 0.8 million tons at the end of 1970/71. Although the situation has thus improved at least temporarily, there is an underlying tendency in the Community to produce excess supplies of about 1 million tons in years of normal harvests. With higher prices, potato crops recovered from the low level of 1969, and production in EEC increased by 3 percent.

TABLE II-1. – WESTERN EUROPE: INDICES OF AGRICULTURAL PRODUCTION

	1966	1967	1968	1969	1970 (preliminary)	Change 1969 to 1970	Per caput agricultural production in 1970
	1952-56 average = 100					*Percent*	*1952-56 average = 100*
PRODUCTION IN SELECTED COUNTRIES (all products)							
EEC	130	142	146	145	148	+ 2	127
Belgium-Luxembourg	110	129	133	139	138	— 1	126
France	135	149	157	152	153	+ 1	130
Germany, Fed. Rep. of	127	138	146	143	143	—	121
Italy	134	139	135	141	144	+ 2	129
Netherlands	123	134	138	142	156	+ 10	127
OTHER WESTERN EUROPE	137	141	143	144	142	— 1	126
Austria	133	145	148	154	147	— 4	138
Denmark	121	123	128	121	117	— 3	104
Finland	130	135	136	152	155	+ 2	139
Greece	171	174	164	174	187	+ 7	165
Iceland	147	148	138	142	143	+ 1	108
Ireland	121	136	135	135	137	+ 1	136
Malta	119	129	160	173	172	— 1	168
Norway	102	105	114	107	114	+ 6	100
Portugal	110	123	123	117	120	+ 3	106
Spain	145	143	156	158	156	— 1	135
Sweden	93	108	113	95	105	+ 10	94
Switzerland	113	122	124	124	127	+ 2	99
United Kingdom	145	148	145	146	154	+ 5	140
Yugoslavia	182	179	173	193	168	— 13	142
REGIONAL PRODUCTION							
Total							
All products	133	141	145	145	145	—	
Food only	134	142	146	146	147	—	
Per caput							
All products	120	126	128	127	127	—	
Food only	120	127	129	129	128	—	

The fruit and vegetable sector continued to be plagued by cumbersome surpluses, in spite of virtually stationary production of tomatoes. Overproduction remains a crucial problem, especially of apples, pears and certain citrus fruits, and to a lesser extent of tomatoes and table grapes, as yields and output are rising more rapidly than demand, the growth of which is hampered by inadequacies of distribution channels that keep retail prices high relative to producer prices. Moreover, the fact that surpluses are financed by public authorities tends to weaken the incentive to adapt production to demand. Subsidies for uprooting poor quality apple, pear, and peach orchards were introduced by EEC in 1969, and increased by 60 percent at the end of 1970 to $800 per hectare.

For wine 1970 was an exceptional year in that good quality was combined with an abundant harvest. French production was 20 percent higher than the average of the preceding five years, and grape harvests were also very large in most other wine-producing countries, with the exception of Greece, Spain and Yugoslavia.

The dairy market, which in recent years has been characterized by surpluses in the northwestern countries of the region, has virtually regained equilibrium. The dairy herd contracted at an accelerated pace in 1970 thanks to slaughter premiums and measures to encourage beef production in several countries, and the reduced profitability of milk production — especially on smaller holdings — because of official price policies, as well as a continuing decline in the attraction of dairy farming as an occupation. Milk production therefore fell again in a number of countries, especially in Scandinavia, and deliveries to dairies declined. Butter production was also lower because of better markets for some other dairy products. With officially encouraged increases in both exports and consumption, butter surpluses have virtually disappeared. At the beginning of April 1971, EEC butter stocks (including those held by private traders) amounted to 65 000 tons, over 200 000 tons less than a year earlier.

Stimulated by growing demand, cheese production continued the recovery of 1969. Dry skim milk production was not larger, and Community stocks have been considerably reduced, also because of larger exports and measures to increase domestic consumption, including feed use.

Measures taken to reduce the dairy herd in EEC and other countries of the region contributed to the 3 percent rise in beef and veal production. Another factor was the recovery of production in the United Kingdom after the foot-and-mouth epidemic of the 1967/68 winter. Mutton production showed signs of revival, with increased slaughterings in France and the United Kingdom, the main producing countries. Egg production increased markedly in most of the region, except Denmark and Sweden.

First indications for 1971 suggest an increase in the region's agricultural output by some 6 to 7 percent, the first significant increment since 1968. Almost all countries appear to have contributed to it with the exception of Italy, Finland and Norway, where production rose only slightly or remained stationary. Particularly large increases were registered for Spain, where output was up by over a tenth, with large increments in wheat and barley, and Yugoslavia, where production recovered by nearly 15 percent after a steep fall in 1970. The combined output of the EEC countries is estimated to have risen by about 5 percent.

Among the major commodities, there were important and widespread increases in output of most cereals, particularly wheat and barley (16 and 18 percent respectively), and to a lesser extent maize (8 percent) and oats (10 percent). In part these

increases were in the nature of a recovery from the 1970 reduction, to which better weather, higher prices in EEC, and a generally improved market situation because of the disappearance of wheat surpluses contributed; for wheat, maize and barley new record levels of regional output were achieved. Particularly large increases in wheat production took place in Portugal (up by almost 60 percent), in Yugoslavia (up by 40 percent, to a new high record) and in Spain and the Federal Republic of Germany (up by about one third); in France and the United Kingdom the production was higher by a tenth or more. Spain showed the largest increase in barley production; other countries which made substantial gains were the Federal Republic of Germany and the United Kingdom.

Milk production is estimated to have remained more or less stationary in 1971. Cow numbers appear to have continued to fall despite a relaxation of the measures to reduce the dairy herd, and producer prices for milk have been raised in a number of countries. Output is estimated to have risen in the Netherlands and the United Kingdom but to have fallen in Austria, Denmark, the Federal Republic of Germany and Finland. Other countries showed little change.

There were substantial increases in the production of pork and poultry, but little expansion in output of beef and veal. The pig cycle passed its peak in May and large increases in production are estimated to have taken place particularly in France, the Federal Republic of Germany and the United Kingdom, but no great difficulties were experienced in marketing, thanks in part to larger exports to eastern Europe. Poultry production increased particularly in the Netherlands, and prices in the region tended to be depressed, although in this case, too, the market situation was eased by considerable exports to eastern Europe and the U.S.S.R. There was little overall change in the production of beef and veal. High quality supplies were abundant, but demand for lower quality beef tended to exceed domestic availabilities, and imports into the majority of countries in the region were larger in the first half of 1971 than a year earlier. Supplies of veal in EEC were particularly ample at midyear and calf prices were at their lowest level since 1968.

Early estimates of sugar-beet crops in the region suggest an increase of some 11 percent in sugar production, with most major producing countries sharing in the rise. In the horticultural sector, little or no change was estimated in vegetable production. The region's output of apples and particularly pears was smaller than in 1970, but the situation continues to be characterized by excess capacity and the increase in the EEC premium for uprooting orchards is so far reported to have only a limited effect. Wine production is estimated to be smaller than in 1970, with steep reductions in France and Spain, and a more moderate fall in Italy.

Fishery production

The fishery production of western Europe was 5 percent higher in 1970, after two consecutive years of decline. This was largely due to increases in Norway, where landings were 10 percent greater, and Iceland. Mainly because of rising prices, the catch value reached a record level.

Norway's catch increase of half a million tons was due to larger landings of capelin for fish reduction. Because of a smaller product yield it is less valuable than traditional Scandinavian raw material fish such as herring and mackerel, but these were in short supply because of poor catches, quota regulations imposed for conservation purposes, and the "upgrading" to food use of a larger part of the herring catch in response to strong demand for food fish. Increasing dependence on resources in deeper waters is necessitating a restructuring of the fishing fleet. One step in this direction was the launching, in mid-1970, of the first Norwegian fish-meal factory ship. Catches of groundfish, and especially of cod and pollock, were so good that in spite of excellent market conditions for virtually all major products fishing limitations had to be imposed.

In Denmark, strikes were partially responsible for reduced landings. Disputes between crews and vessel owners also occurred in the United Kingdom, leading to higher wage costs. Since other costs were also rising, net revenue from United Kingdom fishing operations increased less than expected, despite a moderate expansion of landings and substantially higher prices.

Fish production in EEC countries was somewhat smaller than in 1969. Landings in the Federal Republic of Germany and the Benelux countries were lower, and French production was about the same as the year before. Earnings were generally higher as rising prices more than compensated for increased costs. In this area, too, wage disputes and crew shortages were of increasing concern, leading in some cases to the scaling down of investment plans. Although frozen fish consumption has made gains throughout EEC at the expense of wet fish and other products, in the Federal Republic of Germany the decrease in wet fish consumption seems to have been arrested, and some of the old freezer trawlers which were to have been scrapped were being converted to wet fish operations.

Catches in Spain and Portugal were somewhat smaller in 1970, but the effect on income was offset by an upward movement of prices. Frozen fish

distribution in Spain, which had been stagnating for some time, increased following improvements in quality and in market presentation. In Portugal, a moderate increase in the sardine catch eased difficulties related to raw material shortages in the export-oriented canning industry. Results in the cod fisheries, which largely supply domestic markets, were disappointing.

Forest production

Taking 1970 as a whole, industrial roundwood production and manufacture of processed forest products in western Europe increased, while the persisting inflation in many countries was reflected in rising prices. As the year progressed, however, the slowing down of economic expansion had its effect also on demand for forest products, and by late 1970 conditions in some markets were easier than twelve months earlier.

Active demand and higher prices brought a further increase of about 4 percent in industrial roundwood removals in 1970, to 200 million cubic metres, while the long-term decline in fuelwood production and use continued. Record levels of production were reached for most of the main forest products, including sawn softwood, wood-based panels, wood pulp, paper and paperboard. The steady long-term growth of sawn hardwood output, however, appeared to have been checked. Particle board again showed the fastest increase, though at 11 percent it was much less than the one-fifth increase in 1969. Slower growth of demand was the main factor, but in a few countries there were also temporary shortages of production capacity until the end of the year, when new capacity came on-stream.

Capacity/utilization ratios were also high in the wood pulp sector for much of the year, but with growing competition from North American exporters and the slowing down of demand, the supply/demand balance eased considerably in the autumn and stocks began to accumulate in both producers' and consumers' mills. A series of increases during 1969 and 1970 brought prices of most grades of wood pulp above previous peak levels. The more recent increase, applicable to deliveries in the first half of 1971, met greater resistance from paper and paperboard producers, who were experiencing growing difficulties in passing higher production costs on to their customers.

Trade in agricultural, fishery and forest products

Continuing the trend of recent years, the combined value of western Europe's agricultural, fishery and forest exports increased by some 12 percent in 1970 (Table II-2), about the same rate as the previous year and double the level of the early 1960s. The now fully implemented Common Agricultural Policy (CAP) of EEC is giving impetus to intratrade in agricultural products among the Community countries [1] while subsidies have recently significantly boosted the exports of many commodities — in 1970, rice, dairy products and oranges — to third countries. Overall, the 13 percent increase in the value of agricultural exports is to be attributed to a sharp rise — some 12 percent — in the volume of shipments, especially fruit (notably oranges and grapes), dairy products, wine, poultry, canned meat and tobacco. The unit value received for all exports combined averaged about the same as in 1969, with those for wheat, feedgrains, meat (except poultry) and citrus fruit somewhat higher, but most others remaining unchanged or declining.

TABLE II-2. – WESTERN EUROPE: INDICES OF VALUE OF EXPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	Share of total in 1970	1966	1967	1968	1969	1970 [1]	Change 1969 to 1970
	Percent	*1957-59 average = 100*					*Percent*
AGRICULTURAL PRODUCTS	65	168	182	190	218	249	+ 14
Food and feedstuffs	58	172	188	197	229	261	+ 14
Cereals	(11)	256	277	317	384	384	—
Fruit	(5)	162	164	157	176	187	+ 6
Meat	(16)	228	249	257	290	313	+ 8
Dairy products	(14)	149	161	169	184	234	+ 27
Beverages and tobacco	6	162	180	177	194	235	+ 21
Tobacco	(1)	133	151	121	120	138	+ 15
Wine	(5)	179	198	209	237	292	+ 23
Raw materials	1	109	100	102	101	93	— 8
FISHERY PRODUCTS	8	179	176	171	193	228	+ 18
FOREST PRODUCTS	27	147	143	158	180	194	+ 8
Sawnwood	(7)	120	101	123	148	152	+ 3
Pulp and paper	(15)	160	162	174	191	210	+ 10
Agricultural, fishery and forest products	100	162	169	178	204	230	+ 12

[1] Preliminary estimates.

The movement in export unit values for western Europe is strongly conditioned by the EEC price structure, and may therefore differ from price trends on international markets. In 1970 this was particularly true for grains: with the exception of maize, world prices were lower, but unit values for western European exports either remained unchanged or increased. In the case of rice and dairy products the opposite was the case, with western European unit values declining more than world prices.

[1] See *The state of food and agriculture 1970*, p. 38-41.

As can be seen from Table II-2, value gains in agricultural products in 1970 came primarily from wine and dairy products, followed by fruit and meat, while earnings from cereals remained unchanged despite the rise in unit values. For cereals, this represented a sharp reversal from the 20 percent increase in 1969. In 1970, shipments of wheat dropped sharply, almost to the level of 1968, as the large increases from both the Federal Republic of Germany and Italy (where large stocks had accumulated) were more than offset by a reduction of some 40 percent in those of France, the largest exporter. As during most of the past decade, coarse grain exports continued to expand in 1970 and with unit values higher their value rose by some 15 percent. Notably larger earnings were obtained by the Netherlands and France. Earnings from rice increased by some 25 percent despite a price drop of the same magnitude, as exports from EEC member countries — notably Italy — which are aided by restitutions, were higher.

Despite the decline in milk production in most of western Europe, a reduction in stocks of dairy products enabled most countries to increase the volume of their exports in 1970. The value of both butter and cheese exports was up sharply (50 percent) and that of powdered milk also increased, despite the fact that sales were partially on concessional terms. Both commercial sales and food aid deliveries of skim milk powder to developing countries, where the milk recombining industry is expanding, were larger. The Netherlands, one of the few west European countries which had not reduced its milk production in 1970, was the chief beneficiary (its earnings from dairy exports were 87 percent higher), followed by France.

With the exception of beef and veal, earnings from all kinds of meat exports were higher in 1970 reflecting higher prices (except for poultry) and an expansion in shipments. Important, particularly for pork and poultry, were both the larger volume of intra-EEC trade and of trade with eastern Europe, where markets are expanding and where trade is encouraged by EEC export regulations. The largest gain was registered for pork: earnings, which have been growing for several years, were up by 34 percent, volume by almost as much, and prices were slightly higher. All important exporting countries except Ireland (which had almost tripled its shipments in 1969) and Sweden obtained larger earnings, and for the region as a whole they rose to a level almost twice as high as in 1967 and more than six times that of a decade earlier. Poultry supplies in western Europe were abundant in 1970 and the major exporters all shipped larger amounts, particularly to eastern Europe although, with lower prices, earnings increased less. Beef and veal earnings were lower, reflecting smaller shipments from Denmark, France, the Netherlands and Yugoslavia.

The higher value of fruit exports in 1970 (6 percent) reflected larger shipments of oranges and grapes. Prices were generally lower, and the volume of fruit exports, other than oranges and grapes, was smaller. Spain, which accounts for more than three quarters of the region's orange exports, increased its earnings by more than 50 percent after two relatively poor years. Both trade in and prices of apples were depressed in 1970 as export outlets were reduced because of large crops in several European importing countries, including the Federal Republic of Germany, Switzerland and Austria. Shipments from Italy were down by 25 percent, primarily as a result of competition from France, which was able to expand its share of the smaller market.

The volume of trade in wine increased by almost 30 percent in 1970, principally because French import requirements increased after the small 1969 crop. Another contributing factor was the continued rise in import demand in traditional importing countries and the introduction of free circulation of wine in the EEC area as of June 1970, from which Italy and Greece benefited most. These two countries increased shipments by 84 and 75 percent respectively, and Greece, having become a regular supplier of EEC, now exports three times as much as in 1967. Both Spanish and French exports of wine were also larger in 1970.

The volume of imports grew at about the same rate as the previous year (Table II-3), with coarse grains, soybeans and soybean oil, and dairy products (except powdered milk) replacing wheat and meat as the fastest growing items. Coarse grain imports were some 16 percent larger, with increases of as much as 50 percent for barley and sorghum. Most countries, with the exception of Italy, increased their purchases. There were also widespread and sharp increases in purchases of soybeans and soybean oil in the face of a continued world shortage in competing oils and meals. Of the largest importers, the Federal Republic of Germany increased purchases of soybeans by almost 50 percent and of soybean oil by 30 percent, the Netherlands and Spain both took 20 percent more soybeans, and Denmark and Italy increased their soybean purchases by 30 and 40 percent respectively. France, previously a relatively small importer, took almost eight times more than in 1969. The principal reductions have been for groundnuts (14 percent), copra (22 percent) and sunflowerseed oil (25 percent).

Although imports of all meats combined declined, those of pork rose by 17 percent as the region moved through the peak in the pig cycle. Trade among EEC countries increased sharply, with France, Italy and the Federal Republic of Germany the main im-

TABLE II-3. – WESTERN EUROPE: INDICES OF THE VOLUME OF IMPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	Share of total in 1970	1966	1967	1968	1969	1970 [1]	Change 1969 to 1970
	Percent	*1957-59 average = 100*					*Percent*
AGRICULTURAL PRODUCTS	76	127	126	128	133	137	+ 3
Food and feedstuffs	47	138	138	139	145	150	+ 3
Cereals	(11)	142	133	128	129	139	+ 8
Fruit	(6)	146	144	143	150	149	— 1
Oils and oilseeds	(7)	136	138	140	145	159	+ 9
Meat	(8)	140	154	154	164	163	— 1
Dairy products	(5)	115	117	124	126	133	+ 6
Beverages and tobacco	16	126	127	131	135	144	+ 6
Coffee	(6)	155	159	172	182	186	+ 2
Tobacco	(3)	128	138	132	141	146	+ 4
Raw materials	13	105	96	99	103	100	— 2
Wool	(5)	94	87	95	99	95	— 4
Cotton	(4)	102	96	92	93	90	— 4
Rubber	(3)	116	116	125	140	142	+ 2
FISHERY PRODUCTS	4	167	182	201	193	192	—
FOREST PRODUCTS	20	163	167	186	203	209	+ 3
Sawnwood	(6)	138	139	151	155	159	+ 3
Pulp and paper	(8)	181	182	207	232	245	+ 6
Agricultural, fishery and forest products	100	134	134	139	145	150	+ 3

[1] Preliminary estimates.

porters. Poultry imports, which had failed to increase in 1969, were also larger. On the negative side, United Kingdom purchases of beef and veal were down from their high 1969 level (although this fall is partly statistical because of the shift from dressed carcass to boneless meat) as were those of Spain and the Federal Republic of Germany. Of the major importers only Italy increased its purchases, by a little more than 10 percent. Imports of all dairy products except powdered milk were larger.

Among nonfood products, imports of raw materials, particularly wool and cotton, were lower, reflecting a lower level of industrial activity in several countries and continued intensification of competition from synthetic fibres. Fears of restrictions on textile imports in the United States contributed to a reduction of wool imports by the United Kingdom and Italy, and utilization also fell in the Federal Republic of Germany, Belgium and the Netherlands, and was barely maintained in France. Similar problems were encountered by natural rubber, but imports nevertheless increased slightly above the high level of the previous year, as did those of coffee and tobacco. Tea imports rose by 15 percent, reflecting a 20 percent increase in purchases by the United Kingdom from their low 1969 figure following a return of stocks in that country to more normal levels.

Developments in fisheries trade in 1970 closely followed those in production, with the quantity of exports remaining much the same as in 1969 but with value increasing substantially. Norwegian exports of most products were higher in both volume and value with the exception of stockfish, as exports to Nigeria have so far failed to recover from the effects of the civil war. Denmark and Iceland also had a prosperous year, mainly because of high export prices of frozen groundfish and fish meal.

United Kingdom imports were smaller in volume but higher in value. Although the implications of the new EEC fisheries policy were a major concern to the domestic industry in the United Kingdom, as in the other European Free Trade Association (EFTA) countries, on other grounds there were prospects for greater market stability in the future. This was so in the frozen fish market because of policy coordination between the principal exporters — the Scandinavian countries and Canada — and because the minimum price agreement on frozen groundfish fillet exports from Scandinavia to the United Kingdom, which has been in force since the beginning of 1970, has given positive results. In the fish meal and fish oil market the establishment in mid-1970 of an export marketing organization in Peru was considered a stabilizing influence.

The region's trade in forest products continued to grow in volume in 1970, and even more strongly in value due to price increases for some of the main products, notably sawn softwood and chemical wood pulp, and higher freight rates. Both exports and imports of pulpwood showed very large increases last year, with heavy demand in a number of central European countries and in Norway, the region's largest importer. By the end of the year, however, pulp mill stocks had risen to high levels and forward buying, which had been stimulated by rising prices, had been considerably reduced. Contrary to general trends in the sector, imports of tropical hardwood logs fell back in 1970, partly because imports in 1969 had been very large and end-year stocks were heavy, and partly because of a cautious approach by importers to the development of the 1970 market.

Lower exports of sawn softwood from Austria and Yugoslavia to the Italian market were only partly offset by higher exports from northern Europe and Portugal. The largest increases in purchases were made by the Federal Republic of Germany and the United Kingdom; the latter's imports from Canada recovered strongly when North American prices improved relative to those in Europe. Trade in sawn hardwood also expanded, although the strong growth in European imports from Malaysia and Singapore was checked in 1970; smaller French and Belgian imports from these countries were offset by increases elsewhere.

Finland's plywood exports to North America declined sharply, and this was barely offset by larger exports within the region. Shipments of fibreboard from northern Europe and Portugal to the United States also fell in 1970, only partly compensated by higher exports to the rest of western Europe.

Exports of chemical wood pulp also fell slightly in 1970, as northern European producers retained an increasing share for paper and paperboard manufacture. Imports, however, rose by 5 percent, with increased supplies coming from North America where demand was reduced. Western Europe's net imports of chemical pulp thus rose by approximately 570 000 tons in 1970 to about 2.1 million tons. There was a further increase in the region's trade in paper and paperboard and particle board but, with the exception of newsprint, rates of growth were markedly below those of 1969.

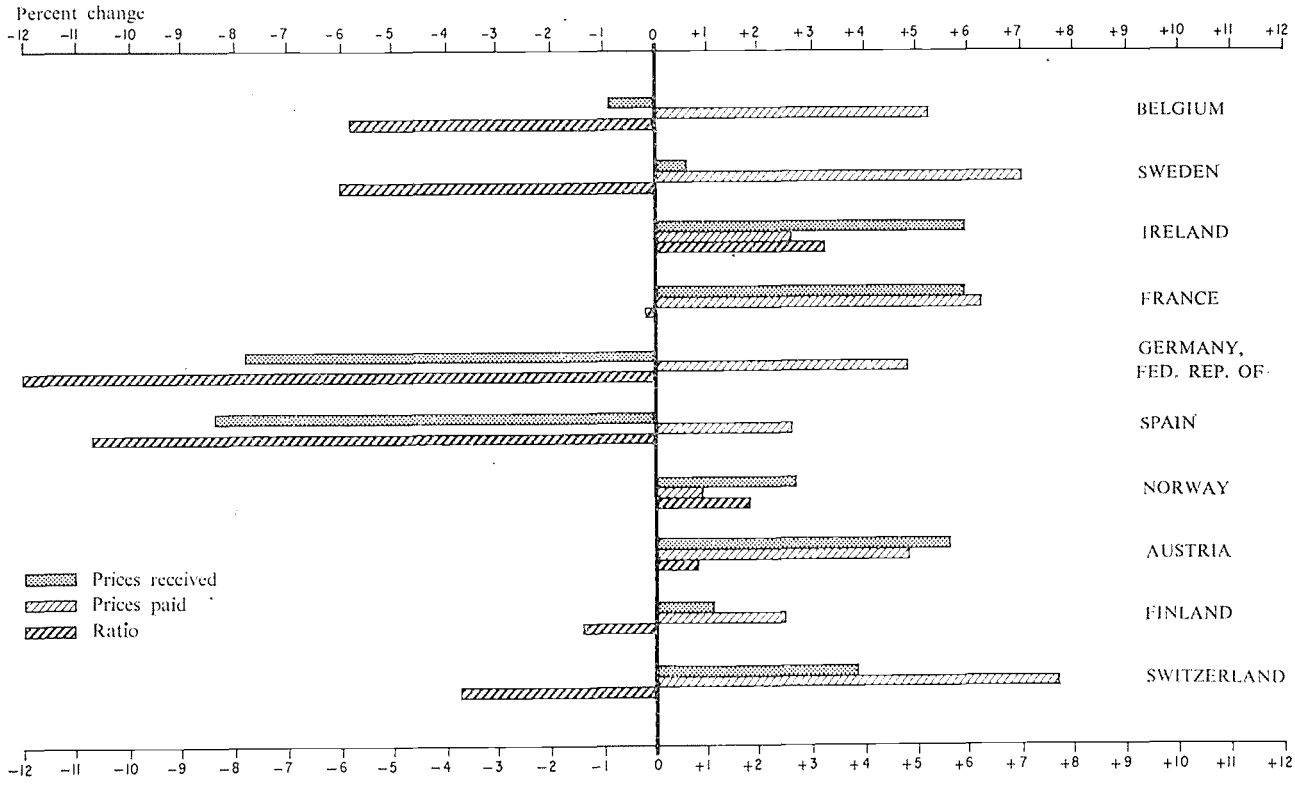
Agricultural prices and incomes

The more pronounced inflation in the region in 1970 raised prices paid by farmers in most countries more than in 1969. In contrast, prices received by farmers in general rose less than in 1969, and therefore the ratio between the two indices generally fell (Figure II-1).

Labour was the greatest source of increases in farm costs in 1969/70, rising in some cases by over 10 percent. Wage rates for unskilled workers rose in most countries by between 10 and 13 percent, and by as much as 26 percent in France; only in Belgium, Denmark, Greece and Norway was the increase less than 10 percent. The trend of rising wages has continued into 1970/71, particularly in France, Ireland, Spain, Sweden and the United Kingdom. The rise in the average cost of animal feed was less pronounced than that of wages because some prices fell, especially for barley. Overall, feed prices remained steady or fell only in the Federal Republic of Germany, Greece and Switzerland, and in Finland they rose only marginally. In the case of fertilizers, price reductions were more common than increases, reflecting the current surplus capacity of the fertilizer industry in many countries.

Domestic farm prices of agricultural products moved broadly in line with the general increases in price levels, and typically averaged some 4 to 5 percent above the 1969 level. In only two countries did prices received by farmers fall: in Spain, and in the

FIGURE II-1. – WESTERN EUROPE: CHANGES IN INDICES OF PRICES RECEIVED AND PRICES PAID BY FARMERS AND RATIO BETWEEN THE TWO INDICES, 1969 TO 1970



Sweden: Change based on period September-December. – Germany, Fed. Rep. of: Change based on period July-February. – Finland: Change based on period September-March.

Federal Republic of Germany where revaluation had the effect of reducing the Deutschmark equivalent of Community prices. In most other countries prices of farm products were raised to take account of higher production costs, although the increases varied between products in accordance with the market situation and production policy goals of governments.

Agricultural expenses in Denmark rose by between 7 and 8 percent, and led to increases in home market prices being granted for meat, butter and eggs, with effect from September 1970. In Finland, from 1 April 1970, prices were raised for milk by 1 percent, for pork and eggs by about 5 percent, and for beef by 13 percent. With the exception of wheat, grain prices were raised from autumn 1970. The overall effect was an average price increase of a little more than 3 percent. Within the two-year (1970/71 and 1971/72) agreement with farm organizations in Norway, price rises in 1970/71 were greatest for livestock products other than milk. Oilcake prices were also raised, but were offset by an increase in subsidies paid for other feedstuffs. To compensate Swedish farmers for the 5 percent increase in consumer prices, domestic agricultural prices were raised (by increasing import levies) enough to increase the farmers' income by 318 million kronor ($61.5 million). Revenue increases granted in the United Kingdom annual price review for 1970/71 amounted to £54 million ($130 million), against estimated cost increases on review commodities of £60 million ($144 million). However, farmers' incomes will also be affected by simultaneous increases in a number of subsidies and grants (including those on fertilizer and lime), capital grants, and bonuses to owners of herds declared free of brucellosis. At the end of 1970/71 all French farm prices were to have been brought back to Community levels, from which they departed after the 1969 devaluation.

Agricultural policies and problems

The agricultural problems of the northwestern countries of the region remain unchanged. The quantitative and qualitative adjustment of supply to demand remains incomplete, despite some results, particularly in the dairy sector. The general inflation — which has raised production costs — and increases in the real incomes of workers in other industries have prevented the income gap between farmers and nonagricultural groups from narrowing. The bargaining power of the producers, through cooperatives and other associations, is improving only slowly, and governments have come under heavy pressure for higher prices and income supports. Since no international measures for supply management are in sight, these pressures may result in further obstacles to international trade.

As in the past, the formulation of agricultural policies remains difficult because of the need to find an appropriate balance between partly conflicting objectives: price policies which ensure reasonable incomes for farmers in the short run, while guiding production so that it better matches demand; and longer term structural policies which, however, tend to suffer from a lack of financial resources because of the high cost of short-term market support.

In the meantime, efforts to retrain agricultural workers and facilitate early retirement continue, for both economic and social reasons. Social security measures for the farm population are also being increased, in line with improvements achieved by workers in other sectors. Another relatively new policy trend is the promotion of regional specialization within countries, and giving increased attention to the preservation of the rural environment, especially for tourism and recreation, which also offer income opportunities for farmers.

Policies for market balance

Prices continue to play a key role in policies which aim at adapting production to the rapid changes in the structure of demand. Surpluses, mainly of wheat, butter and skim milk powder, costly to store and dispose of, were largely eliminated in 1970. However, the reduction in output was due not only to policies, but also — especially for wheat — to weather, and it is not yet certain that the underlying tendency for surplus production has disappeared. Besides, in several countries subsidies not tied to the production of any given commodity are becoming increasingly important.

A major policy objective that has emerged generally is to increase meat production for both home consumption and export, combined in the southern European countries with measures to raise the quantity and quality of their dairy output. The measures adopted follow three main lines. One is that of encouraging coarse grain production at the expense of wheat. Finland, which since 1968 has tried to cut down total agricultural production by reducing the area, will now enter into delivery contracts with producers who carry out such a policy. Austria has again raised feedgrain prices relative to those for breadgrains. Spain's second plan (1968-71) aims to reduce surplus production of rice and hard wheat in favour of maize and barley for brewing. In Greece direct payments on wheat production have been discontinued, and applied instead to fruit and vegetables. On soils unsuitable for wheat, Portugal's price policies encourage maize and oilseed production. Only Yugoslavia, whose wheat output fell

by 22 percent in 1970, has raised wheat prices (by 20 percent) to encourage production.

Another group of measures is linked with those taken in northwestern Europe to reduce dairy production and stocks. In EEC, 290 000 head of cattle have been slaughtered by 65 000 farmers, who have agreed to give up dairying completely. Another 250 000 head have been slaughtered in response to premiums paid for not selling milk and milk products. Both programmes have encouraged a switch to beef production, and while they have not been continued into 1971 because the dairy market has improved and because additional supplies of beef would further depress pig prices, subsidies for using milk and skim milk for animal feed have been maintained. With the same aim in mind, French dairy farmers are now being paid for their milk according to its fat and protein content and standard of hygiene, thus encouraging less efficient producers to shift away from dairying. Ireland and Austria have reduced price supports for milk and dairy products, while Finnish farmers will benefit from a new subsidy if they agree to abandon milk production for at least three years. Under the Swiss policy, 30 000 dairy cows were slaughtered in 1970, instead of the 5 000 aimed at. Consequently milk support prices were raised in autumn 1970 and again in spring 1971, but the quantity for which they are paid remains unchanged, and the producers themselves must bear the cost of disposing of any milk in excess of that quantity.

The third policy approach, followed by several countries and often combined with the reduction of dairy output, is the direct promotion of meat production, particularly beef. In France, where aid is often channelled exclusively through producers' associations, credit for beef production has been doubled for 1971, and aims above all at increasing the number of breeding cows and raising more calves for fattening. Other measures have been taken to encourage the production of pig and poultry meat and mutton. The 1969 Beef Cattle Incentive Scheme in Ireland continues. Yugoslavia has modified quality requirements for beef cattle, leaving the base price unchanged but raising the average price to encourage exports of " baby beef." Greek policy aims at shifting production from unprofitable crops to livestock, to achieve self-sufficiency in meat and dairy products. New measures announced at the end of 1970 include support prices for fresh meat, the setting up of an organization for market intervention, and various direct aids to encourage meat production.

A fundamental change is being effected in the agricultural price policies of the United Kingdom. The system of free imports and retail prices, combined with deficiency payments to farmers, is being abandoned in favour of one similar to that operated for many products by EEC, with its minimum import prices, threshold prices and variable import levies. Such a system was introduced in 1970 for eggs and egg products, was extended in July 1971, in agreement with overseas suppliers, to beef and secondary dairy products, and will be applied to mutton and lamb in the future. The existing quotas and voluntary limitations for butter, cheese and bacon remain in force, supplemented by minimum price provisions. Minimum cereal import prices were to be raised within the agreement with suppliers expiring on 30 June 1971. The effect of the new policy will be to raise market prices and to reduce, although not eliminate, the deficiency payments, thus shifting some of the burden of price-income supports from the Exchequer to the consumer. The annual price review gave United Kingdom farmers an average rise of 9 percent in guaranteed prices for 1971/72.

Structural reform policies

National authorities are increasingly convinced that structural policy in agriculture must be coupled with social measures to facilitate a shift of manpower out of farming. However, their policy formulation is hampered by lack of knowledge about the effect of future technical and economic changes on the profitability of operations, and hence by uncertainty as to the desirable nature and size of farms.

France passed two important laws in 1970 which aim at facilitating the modernization of farm enterprises. One, which provides incentives for longer leases (of at least 18 years) by offering landowners tax advantages and better rents, will help to alleviate farmers' indebtedness as they will be less inclined to buy the land they farm. To prevent fragmentation, the other act grants tax privileges to groups engaged in the collective farming of private holdings. It also extends the right to participate in such groups to persons contributing only cash (previously membership was conditional on ownership of land or real estate), with the aim of slowing down or even reversing the movement of capital out of agriculture.

A two-part structural reform programme was started in the Federal Republic of Germany in early 1971. The first part aims at encouraging investment and at the same time improving the distribution of assistance among farmers according to the profitability and future prospects of their holdings. To this effect, farmers will be encouraged to prepare farm development plans, which must accompany any request for assistance under the law. A complementary programme under the same law aims at improving social conditions in agriculture and forestry, mainly by helping farmers with unprofitable farms to leave the land. Since 1970 subsidies are given to

farmers who, by 1972, take their land out of production and either sell it or rent it for not less than 12 years.

Structural measures in the Friesland dairying province of the Netherlands aim to reduce within five or six years the number of holdings from the present 13 000, with an average of 24 cows per farm, to 6 000 with an average of 50 cows, and to increase the size of arable farms to about 50 hectares. There will be subsidies for construction and modification of buildings, as well as slaughter premiums for farms going out of production, and improved retirement provisions.

In Austria, a retirement scheme for farmers was started in 1971 to encourage reallocation of land. Finland's "soil bank" operation, which aims at slowing down output growth and matching it more closely with domestic demand, has been strengthened and expanded. About 150 000 hectares, or more than 5 percent of total farmland, have already been retired. In 1970 the limit on the subsidy per farm was removed and replaced by a diminishing scale of compensation. Municipal and other jointly owned farms can now also benefit, at a reduced rate. A new farmers' retirement law was passed early in 1970 which, by assisting older farmers to retire, should reduce milk production.

Spain's development plan (1968-71) emphasizes land improvement. By 1970, consolidation of farms had covered 357 000 hectares, 65 000 hectares had been irrigated and 110 000 hectares reforested. Producer associations have been encouraged, particularly for wheat and pigmeat. Under recent decisions in Portugal, assistance will be given to producer cooperatives, particularly for fruit and tomatoes, and also to groups producing tomato concentrate wishing to increase their exports. Structural reform of marketing as well as production was the subject of late 1970 announcements, including subsidies and credit facilities for areas of intensive crop farming, and the conversion of marginal land to forest and pasture.

Common Agricultural Policy

One of the objectives of the Common Agricultural Policy (CAP) of EEC, specified under Article 39 of the Treaty of Rome, is to give the agricultural population an equitable living standard. Up to now, it can hardly be said that this objective has been reached. Although agriculture in 1969 employed 14 percent of the total labour force, it contributed only 6 percent to the Community GNP. The inadequacies of CAP have become evident in the difficulties experienced in maintaining market equilibrium, in the heavy financial burdens it places on the central authority, and a growing disparity of income among farming categories resulting from the centralized and uniform management of markets. A memorandum of the Commission in 1968 insisted on the need for structural reform and social assistance, and in April 1970 firm proposals were put to the Council. In the course of the year inflation accentuated the relative decline of agricultural incomes. At the same time, however, surpluses were eliminated. Consequently, in spite of — or possibly because of — possible accession to the Community of countries with lower agricultural prices, the Commission proposed the raising of prices which had stood still for three or four years. However, it also asked that the granting of higher prices be tied to a decision on structural and social programmes, the whole to be considered an inseparable means of making a too uniform policy more selective.

Concerned over the worsening economic and social situation of farmers, and under pressure from their organizations, the Council subsequently adopted a resolution regarding the new orientation of the Common Agricultural Policy. For 1971/72 it fixed somewhat higher prices than those proposed by the Commission (see Table II-4) and announced measures which will make the implementation of the Mansholt plan possible.

At the same time the subsidy on skim milk powder for animal feed was raised, with the overall effect that milk and beef will become more profitable in relation to crop production. The stimulus to beef production has a logical place among the measures to reduce the Community's deficit in that commodity. In the case of milk production, concern has been

TABLE II-4. – EUROPEAN ECONOMIC COMMUNITY: PRICES EFFECTIVE IN 1971/72

	Indicative or target price		Intervention price	
	Level in 1971/72	Increase over 1970/71	Level in 1971/72	Increase over 1970/71
	Units of account[1] *per ton*	*Percent*	*Units of account*[1] *per ton*	*Percent*
Soft wheat	109.44	3	100.72	2
Durum wheat	127.50	2	119.85	2
Rye	100.42	3	92.82	2
Barley	100.21	5	92.02	4
Maize	96.90	1	—	—
Rice (husked)	202.00	1	—	—
Beef	720.00	6	—	—
Veal	942.50	3	—	—
Milk	109.00	6	—	—
Butter	—	—	1 780.00	3
Skim milk powder	—	—	470.00	13

[1] 1 unit of account = $1.00.

expressed that the price increase might compromise efforts to reduce surpluses and prevent their reappearance. However, the price for butterfat was raised by only 2.6 percent, compared with 13.9 percent for protein content, while in the case of skim milk powder used for animal feed the large increase in the subsidy should prevent stocks from rising again to 1969 levels. The overall effect of the price rises for dairy products will probably be some encouragement to veal, pork and poultry production.

The new cereal price relationships may encourage the reemergence of surpluses of soft wheat and even more of barley, which is being increasingly replaced by maize in animal feeding. Increases in wheat and barley output are most likely in France, because prices there will have risen to the new Community level before the end of the 1970/71 season, after separation at the time of the 1969 devaluation.

Compared with the original programme and that of 1970, the structural and social proposals of the Council can only be viewed as an initial affirmation of the need to modernize farming according to common, instead of differing, if not contradictory national criteria. A step forward is the link they provide, for the first time, between price and structural policy, but the means of carrying out structural policy have been greatly reduced. Farmers aged 55 to 65 years leaving agriculture are to get a life pension of $600 a year, plus a lump sum according to area, instead of the $1 000 proposed by the Commission, which also suggested payment to farmers aged 45 to 55 years who undertake to retire at the age of 55. By way of comparison, France has granted since 1964 some 300 000 retirement pensions averaging $510 a year and it is expected that 60 000 more will be granted in 1971. These pensions are paid to farmers aged 65 whose retirement makes way for the young or for the enlargement of farms. In predominantly rural and in mountain regions the pension is payable from the age of 60. The Federal Republic of Germany and the Netherlands operate similar schemes. It is in Italy, where there is no retirement scheme and where 21 percent of labour is in agriculture, that the Community decision could have most effect. However, in spite of the special benefits which will be granted to the poorest regions, after taking account of Italy's contribution to the common fund the burden on that country's national budget will be heavy.

For farmers continuing to farm, a selective system is envisaged, reserving aid for those with adequate skills who submit a development plan covering a period up to six years, or longer in some regions. Income will be at least comparable with regional nonagricultural income. The proposal is less precise and exacting than the Commission's and leaves more to the discretion of national governments. Assistance includes a guarantee on borrowing, except for land purchase, and limitation of interest to 5 percent, but there is no capital grant or income allowance for those whose starting point is less secure.

Community financing will as a rule be 25 percent rather than the 50 percent requested by the Commission. It may, however, reach 65 percent in some ill-favoured regions, particularly in Italy. For the first four years, 1 500 million units of account are allocated, including both accumulated reserves and the 285 million units of account a year already allotted for structural policies by the European Agricultural Guidance and Guarantee Fund. At the end of the four years the possibility of an increase will be considered. The efficiency of the programme will ultimately depend on the national authorities, who retain executive powers. In addition, much will depend on the active participation of farmers — a basic premise of the original proposals — which will be largely determined by the attitudes taken by farmers' organizations.

Enlargement of EEC

The agreement reached concerning the membership of the United Kingdom in EEC, which will come into effect on 1 January 1973 if ratified by the legislative organs of all of the countries concerned, provides for the gradual application of the Common Agricultural Policy during a transitional period running to 1977 or, for some measures, the end of 1979.

Agricultural prices in the United Kingdom, which are presently below the Community level, will be increased in six equal steps between 1 April 1973 and 31 December 1977. With only two exceptions, the United Kingdom will apply fully the system of Community preferences. The first, the acceptance of which was facilitated by the recent disappearance of surpluses of milk products,[2] concerns United Kingdom imports of butter and cheese from New Zealand, as discussed on p. 68. The second involves the Commonwealth sugar producers. The Commonwealth Sugar Agreement will continue to operate as before until its expiry in December 1974, at which point EEC will decide what terms of access it can offer to the less developed of the supplying countries under the Agreement (that is, all except Australia). As the agreement with EEC explicitly states that the interests of these countries will be safeguarded, it is expected that their exports to the United Kingdom will be maintained at about the present level. It was also agreed that these countries would be eligible for associate membership or bilateral trade agreements, for which the negotiations would take place in 1974 when the Yaoundé Convention comes up for renewal.

[2] See p. 12.

As regards the structural agricultural policy, the agreement contains assurances for safeguarding the future of hill farming, which in the United Kingdom employs 17 000 people full time and provides 7 percent of the agricultural production on 30 percent of the cultivated land. Government subsidies could be continued, as in Italy, on the condition that they are in accordance with the Community's rules of fair competition and the CAP.

The United Kingdom's contribution to Community expenses will increase gradually during the transition period, from 8.64 percent in 1973 to 18.92 percent in 1977, the latter figure corresponding to the country's proportion of the GNP of the enlarged EEC. After a further transitional period of two years, the country will participate fully in the financing of the CAP by passing to the Community, like other member countries, all of its receipts from customs duties and import levies and a part of the value added tax.

Negotiations with the other three countries which have also applied for membership (Denmark, Ireland and Norway) are expected to be concluded toward the end of 1971. Broad agreement on the agricultural aspects of the terms of entry have already been reached, including immediate application of the Community preferences, equalization of agricultural prices in five steps, a progressive elimination of tariffs between member countries, application of the common external tariff and participation in the financing of Community expenses. The problems which remain to be solved arise from the specific characteristics of each country's agriculture, such as the competition faced within the Community by some of the major farm exports of Denmark and Ireland, and the difficult conditions for agriculture in Norway, for which the continuation of some degree of protection is sought.

EEC FISHERIES POLICY

After more than seven years of study and negotiation, a common fisheries policy was adopted by EEC in October 1970, with effect from 1 February 1971.

The policy includes regulations on the establishment of common structures and of a common market organization. The structural regulation provides for equal access by all member countries to the marine fishing areas under their jurisdiction, except for certain coastal zones where the population is heavily dependent on fishing, and where access may therefore be restricted during the next five years. Criteria are defined for national financial support of research, development and training activities to improve technical efficiency and provide higher living standards for fishermen.

The second regulation covers market support and protection. Market support is to be achieved by encouraging the establishment of product quality standards and the formation of producer organizations authorized to withdraw products from the market, and by government intervention through partial reimbursement to the producer organizations of the costs of withholding products for which members have been indemnified, purchase of fresh sardines and anchovies, aid to private storage of certain frozen products, and deficiency payments for fresh tuna.

Imports are subject to a common external tariff. In addition, for certain fresh, chilled and frozen fish, a reference price system has been established under which imports may be suspended, limited, or made subject to a compensatory tax, if offered at entry prices calculated to be below the reference prices. In the case of some commodities, where reference prices would be seriously opposed by third countries, national quantitative restrictions on imports are to remain in force. Exports subsidies may be paid to cover differences between EEC and world prices.

Implementation of the common fisheries policy will be the responsibility in the first place of producer organizations and national governments. The Community itself will establish ceilings on withdrawal prices which producer organizations may set, and will fix " orientation " prices to determine reimbursements for products withdrawn from the market, " intervention " prices relating to government purchases of fresh sardines and anchovies, a Community " producer " price for fresh tuna to guide governments in making deficiency payments, and " reference " and " entry " prices governing protection against imports. It will also provide financial assistance, from its agricultural support fund, to national governments to meet expenditures for promoting structural reform and market support tied to certain product quality standards and protection. To carry out these functions, two committees, on fishing structures and on fish management, have been created under the Commission.

The suitability of the newly established policy for an enlarged EEC including the United Kingdom, Ireland, Denmark and Norway has, however, been questioned. Doubts relate to fears about economic hardship for coastal fishermen under the open access clause and the impact which the possible consolidation of shore facilities would have on fishery operations in more remote areas. Agreement was, in fact, reached during the course of the negotiations with the United Kingdom to reconsider the provisions of the new fisheries policy regarding access to fishing territory of coastal states. On the marketing side, problems are expected to arise in connexion with trade among members of an enlarged Community, for

instance because the policy would threaten the existence of the EFTA understanding on frozen fillets which has brought about some degree of stabilization in this key sector.

FOREST POLICIES

In western Europe, as in North America, growing concern about the preservation of the environment has caused a number of governments to take action. Both the United Kingdom and France have created ministries of environment, while in the Federal Republic of Germany a national environmental committee has been established in which foresters are given primary responsibilities.

While the environmental aspects of forestry may in the short run limit the extraction of timber in many countries, the growing area of marginal and former farmland being reforested is a partial guarantee for a reasonable balance between supply and demand for wood in the region, or at least against the emergence of major longer term imbalances. Theoretically, the region's forest resources are considered sufficient to satisfy a considerably greater demand for wood than exists today, and forest improvement measures, including the use of fertilizer, will in the short term add to their production potential.

In the meantime, problems of exploitation are arising from the increasing scarcity of labour and rising wages in rural areas. This is resulting in a higher degree of mechanization and the use of teams of highly skilled permanent forest labour. On the other hand, seasonal work in forests is an important source of income for small farmers, particularly in some Nordic countries and Austria and Switzerland, and the loss of such earnings would be a severe economic blow for them. The fact that most European private forests are scattered and generally small is, moreover, a serious obstacle to more rational management practices and better returns. Cooperative management systems are being tried successfully, for example in Sweden, and are favoured by new legislative action in France and the Federal Republic of Germany. They facilitate investment to increase production and mechanization, and are thus an important component of the efforts to combat the profit squeeze that has developed over the past two decades.

At its fifteenth session, the European Forestry Commission considered that before meaningful new forest policies could be formulated, it was necessary to have an adequate, realistic evaluation of the indirect and environmental benefits which the forests give to society. The identification of type and composition of long-term requirements for raw wood materials is also important, particularly with regard to size, and thus whether management should aim at the production of large- or small-sized raw material. Demand for the latter is growing much faster, but harvesting costs are greater than for large-sized wood. The rather rapidly changing technology of industrial wood processing may also lead to at least a partial change in traditional rotation cycles and the species composition of the forests.

Eastern Europe and the U.S.S.R.

Economic expansion in the U.S.S.R. accelerated in 1970, the net material product increasing by 8.5 percent, compared with 5 percent in 1969. In eastern Europe the relatively poor performance of agriculture held back growth, which for all countries combined remained virtually unchanged at about 5.5 percent. Poland alone showed an acceleration. Industrial output grew faster everywhere, averaging about 8 percent, and was roughly the same in eastern Europe and the U.S.S.R. The rate of increase in labour productivity was also greater, averaging 7 percent in 1970 compared with 5 percent in 1969. In general, the growth of industrial employment tended to slow down and averaged only 1 percent in 1970.

Agricultural production

Although 1970 was a relatively poor year for agriculture in many eastern European countries, the steep recovery in the U.S.S.R., where output had fallen in 1969, brought the production index for the region as a whole up by 6 percent (Table II-5).

Most major crops and livestock products participated in the 9 percent increase of output in the U.S.S.R. (Table II-6). The cereals crop was exceptionally good, a large yield increase more than compensating a reduction in area. Output rose by 15 percent to 186 million tons,[3] a level sufficient for

[3] Includes 7.6 million tons of pulses.

TABLE II-5. – EASTERN EUROPE AND THE U.S.S.R.: INDICES OF AGRICULTURAL PRODUCTION

	1966	1967	1968	1969	1970 (preliminary)	Change 1969 to 1970	Per caput agricultural production in 1970
	1952-56 average = 100					*Percent*	*1952-56 average = 100*
Eastern Europe	147	153	155	154	152	— 1	135
U.S.S.R.	175	174	183	176	191	+ 9	152
REGION	165	166	173	168	178	+ 6	146

the plan target — an average of 167 million tons a year in 1966-70 — to be reached. Wheat output increased by 25 percent to 99.5 million tons, still slightly less than in 1966; rye and barley harvests also increased greatly, oats to a lesser extent, but the maize crop was down by one fifth. Most other crops showed — in contrast to 1969 — increases in 1970, but sunflowerseed production fell a further 5 percent, and flax output was also smaller. Five percent more fruit was delivered to the State, and sugar-beet production increased by 10 percent.

In eastern Europe bad weather was widespread and the combined production index for the area fell slightly. Output was affected particularly in Romania and Hungary, where floods caused loss of production on 560 000 and 300 000 hectares respectively. The largest increases in total output in eastern Europe, by 4 percent, were achieved by Albania and Bulgaria, although compared with their ambitious plan targets the growth was not considered satisfactory, especially in Bulgaria where drought had caused a setback in 1968. Czechoslovakia, which after two years of exceptionally good weather had reached or even passed the medium-term plan targets by 1969, had anticipated only a marginal increase in 1970. In Poland, the 2 percent increase in production was not nearly enough for full recovery from the 1969 losses. Toward the end of the year, in fact, steep increases in food prices were announced, although these were subsequently cancelled in March 1971 after supplies had been increased through imports. In flood-stricken Hungary and Romania total output declined by about 5 percent. The damage seems to have been greatest in Romania where output in 1969, moreover, had failed to make good the setback of the previous year. Scanty information on the German Democratic Republic indicates that total output did not increase and may even have declined slightly from the already low 1969 level.

The setback to crop production in eastern Europe in 1970 was mainly in grains, which in recent years have withstood adversities of weather fairly well,

TABLE II-6. – EASTERN EUROPE AND THE U.S.S.R.: ANNUAL CHANGE IN AGRICULTURAL PRODUCTION, 1966-70, AND 1970-71 TARGETS

	1966	1967	1968	1969	1970 [1] actual	1970 target	1971 target
	Percent						
ALBANIA							
Crops	...	...	...	...	...	23.0	...
Livestock products	...	...	...	...	...	7.0	...
Total	12.5	12.0	2.5	10.0	4.0	17.0	25.8
BULGARIA							
Crops	19.0	1.8	—10.4	5.3	...	...	...
Livestock products	5.8	6.9	1.3	3.3	8.2	...	...
Total	14.3	3.5	— 7.3	2.2	4.0	[2]12	...
CZECHOSLOVAKIA							
Crops	21.3	5.3	6.4	1.1	— 3.3	—1.5	...
Livestock products	3.0	5.7	4.8	0.8	5.7	1.9	...
Total	11.0	5.6	5.5	1.0	1.3	0.3	...
GERMAN DEMOCRATIC REPUBLIC							
Crops	3.4	9.4	— 1.9	—15.1	...	...	...
Livestock products	4.8	2.3	3.6	0.9	2.5	...	...
Total	4.1	5.5	1.0	— 6.3	...	...	...
HUNGARY [3]							
Crops	11.6	3.6	— 1.2	12.3	— 12.0	—	...
Livestock products	4.0	4.7	2.8	— 4.0	7.0	2 to 3	...
Total	8.3	4.1	0.5	5.2	— 5.0	1.0	...
POLAND							
Crops	5.1	3.7	5.2	— 8.0	4.1	4.2	2.0
Livestock products	5.4	0.3	3.1	0.7	— 1.4	1.0	3.0
Total	5.2	2.4	4.4	— 4.7	1.9	2.9	[2]2.5
ROMANIA							
Crops	16.5	—1.9	— 3.9	5.4	—12 to —15	...	...
Livestock products	12.3	7.7	— 3.0	—	— 9.8	...	...
Total	14.0	1.8	— 3.6	3.1	— 5.4	16.0	...
U.S.S.R.							
Crops	13.0	—	6.0	— 6.0	10.4	...	...
Livestock products	4.0	2.9	2.0	— 1.0	7.0	...	...
Total	8.6	1.4	4.5	— 3.3	8.7	8.2	3.3

[1] Preliminary estimates. – [2] Revised plan target. – [3] From 1968 onward the data are not strictly comparable with those for the previous year because of a change in the price base.

but the output of which in 1970 contracted by some 10 to 11 percent. The largest falls, of about 20 percent, occurred in Hungary and Romania, but output declined also in Poland and Czechoslovakia, by 14 and 8 percent respectively. A record maize harvest and a moderate expansion in wheat output raised total grain production in Bulgaria by about 15 percent, and there was a rise of about 4 percent in Albania. Output in the German Democratic Republic is reported to have been unchanged or slightly smaller than in 1969. Sugar-beet production expanded by 3 or 4 percent: there were excellent harvests in Bulgaria and Albania, but in Romania and Hungary

output fell by about 11 percent and more than 30 percent respectively. Potato production in Poland was near the record level of 1968, but in Czechoslovakia, the German Democratic Republic and Romania output was well below the levels of the first three years of the 1966-70 plan. Output of fruit and vegetables varied from country to country, with particularly good results in Poland. Production of fodder crops was generally good, especially in Czechoslovakia and Hungary.

Increases in meat production in the region have come to depend much more on pigs and poultry than on cattle. In the U.S.S.R., for example, output of beef and veal fell in 1970 by 4 percent, but that of pigmeat rose by 10 percent and of poultry by 22 percent. Egg production in that country rose again, and yield increase led to higher milk production. In eastern Europe the output of livestock products increased in 1970 everywhere except in Poland and Romania. In most other countries production of beef and veal was slightly less than in 1969, but this was more than offset by large increases in production of pigmeat and poultry. In Czechoslovakia output of meat rose by nearly 7 percent. Large-scale production of poultry was stepped up in many countries, especially in Bulgaria and Hungary, where increases of 30 and 24 percent, respectively, took place. Pig numbers in these two countries rose by 20 and 26 percent respectively, due to excellent results on the large state and collective farms and to improved conditions on the small private holdings. Output of milk and eggs was larger everywhere in eastern Europe.

An examination of the results of the period from 1966 to 1970 suggests that the bases for production have continued to expand and improve, and that setbacks have been due to weather. True, planned output targets were reached or exceeded only in Czechoslovakia and Poland, the other countries having shortfalls. Even so, as data in Table II-7 indicate, progress of production between 1961-65 and 1966-70 was more rapid than between 1956-60 and 1961-65, except in the German Democratic Republic. At the same time it should be noted that most, in some cases all, of the improvement in the rate of growth of total agricultural production took place in the crop sector. The annual rate of growth in livestock production increased substantially only in Czechoslovakia, although from a relatively low level. In Bulgaria it slowed down slightly, but remained comparatively high.

First, largely unofficial, estimates for 1971 suggest that agricultural output in the U.S.S.R. will remain at roughly the same level as the previous year, while in most eastern European countries it is expected to increase. The regional total may therefore increase

TABLE II-7. – EASTERN EUROPE AND THE U.S.S.R.: CHANGES IN RATE OF GROWTH OF AGRICULTURAL PRODUCTION

	1956-60 to 1961-65	1961-65 to 1966-70
	..... *Percent per year*	
BULGARIA		
Crops	3.9	[1]4.7
Livestock products	4.9	[1]4.6
Total	4.3	4.6
CZECHOSLOVAKIA		
Crops	— 0.4	3.4
Livestock products	1.3	3.6
Total	0.5	3.5
GERMAN DEMOCRATIC REPUBLIC		
Crops	0.9	—
Livestock products	2.7	[1]3.0
Total	1.8	[1]1.0
HUNGARY		
Crops	1.0	[1]3.0
Livestock products	2.5	[1]2.5
Total	1.6	[1]2.8
POLAND		
Crops	2.8	3.4
Livestock products	2.3	2.3
Total	2.6	2.9
ROMANIA		
Crops	2.3	[1]3.9
Livestock products	3.4	[1]4.8
Total	3.2	4.2
U.S.S.R.		
Crops	2.2	4.2
Livestock products	2.6	3.7
Total	2.3	3.9

[1] Partly estimated.

by some 1 to 2 percent. Wheat output will probably be fractionally lower: larger crops are expected throughout eastern Europe but it is unlikely that the harvest in the U.S.S.R. will reach the exceptionally high level of the previous year, because of the late ripening of crops in eastern and northern areas, and the consequent danger of damage by autumn rain and snow. Coarse-grain harvests in the region are estimated to be some 4 percent larger, with a sharp rise expected in the output of maize, possibly up by as much as 25 percent in the U.S.S.R. and Romania, and by more than 10 percent in Hungary, where good weather contributed to early ripening and harvesting, and in Bulgaria. The rye harvest should also be larger, primarily because of a sharp increase in the Polish crop. Potato harvests were expected to be considerably larger in Czechoslovakia and Romania, the smallest producers, but unchanged or smaller elsewhere. Sugar production is expected to show a recovery in Romania and Hun-

gary from the losses sustained in 1970, and with some increase also likely in the U.S.S.R. the regional total should rise by some 4 percent. Sunflowerseed and cotton crops are both estimated to have been slightly larger.

Meat production in the region is thought to have shown some increase in 1971. In the U.S.S.R., production on the state and collective farms was reported to have risen by 8 percent; there was little expansion in beef and veal, but the output of pork and poultry meat continued to rise in line with the recent trend. In eastern Europe, early data for 1971 show little progress in meat production, despite efforts to increase it, especially pork. The only substantial expansion reported regards Hungarian output of pork, but the country remains a minor producer.

Fishery and forest production

The region's fish production rose by slightly more than 5 percent in 1970, reflecting an increase in the output of the U.S.S.R. (accounting for nine tenths of the total catch in the region) which remains one of the world's top four producing countries. U.S.S.R. output has more than doubled over the last decade — from 3 million to almost 7 million tons — with marine fish, particularly cod and related species and mackerel, registering the most rapid gains. Increasing attention is now being given to the development of inland fisheries and the production of freshwater fish is expected to double by 1975. Among the other countries in the region there was a rapid increase in Poland, where output rose by almost 10 percent in 1970 to nearly 500 000 tons.

Roundwood removals in the U.S.S.R., excluding removals from state farms, rose by about 6 percent in 1970. Part of this increase went into roundwood exports to Europe. Scanty evidence from eastern European countries suggests that there, too, removals rose above 1969 levels.

After reaching record levels in 1969, it is estimated that U.S.S.R. production of sawn softwood and hardwood remained more or less stable in 1970. In eastern Europe, a steady downward trend in sawn softwood output between 1966 and 1969 was reversed in 1970, with each of the three main exporting countries — Romania, Poland and Czechoslovakia — raising its production. Output of sawn hardwood in eastern Europe remained steady in 1970. In the wood-based panels sector, previous trends were maintained in 1970, with further growth in production in eastern Europe of particle board and fibreboard and little change for plywood. In the U.S.S.R., moderate growth occurred in the production of all three types of panels.

Trade in agricultural products

Data on the trade of eastern Europe and the U.S.S.R. were still insufficient at the time of writing to allow the calculation of the usual regional trade indices for 1970. The U.S.S.R. continued in its position as a net grain exporter for the fourth consecutive year, although on a smaller scale than the year before because of the poor 1969 harvest. The volume of gross exports of wheat was some 20 percent smaller than in 1969 (4.7 million tons as compared with 6 million tons), while gross imports increased from 38 000 tons to some 1.8 millions tons, thus reducing the net export balance to less than half that of the previous year. Exports of flour were about one third larger. Despite the bumper grain crop of 1970, the U.S.S.R. has agreed not only to take the 1 million tons of Canadian wheat remaining from the 1966 long-term contract, but to purchase an additional 2 million tons for delivery by the end of 1972. These decisions may have been influenced by the less favourable crop forecasts for 1971, but in part the purchases may go to third countries, namely eastern Europe and Cuba, as well as to the eastern areas of the U.S.S.R., since transport costs may be lower than if the grain were shipped directly from the country's own wheat lands.

Generally reduced harvests in 1969 and 1970 and the continued rise in domestic consumption also caused a drop in exports of edible vegetable oils (largely sunflowerseed oil) from 696 000 tons in 1969 to 372 000 tons in 1970. Imports, consisting mostly of olive, coconut and palm oils purchased from developing countries, rose from 23 600 to 64 000 tons. For sugar, U.S.S.R. imports from Cuba, which are estimated to have exceeded 3 million tons compared to 1.3 million tons in 1969, were the highest since 1961. At the same time, exports of refined sugar increased moderately — from 1.4 to 1.5 million tons.

No information is yet available on exports of meat, which declined sharply in 1967 and 1968 as a result of difficulties in the livestock sector, but since the production of beef and veal has continued to decline, it would seem likely that shipments have fallen even further in 1970. At the same time, imports have more than doubled, making it likely that the country has returned to the position of being again a net importer, for the first time since 1965.

In addition to wheat, sugar, meat and vegetable oils, larger imports of many other commodities were also a feature of the trade of the U.S.S.R. in 1970. These include eggs (up by one quarter), fish (14 percent), tea, citrus fruit and all principal agricultural raw materials. Imports of cocoa beans remained unchanged, while those of coffee fell by about 15

percent following an increase of more than one quarter in 1968 and of one half in 1969.

In eastern Europe the progress made in the grain sector over the last few years continued to be reflected in trade in 1970, as the impact of the setback to production in that year had not yet been felt. In Hungary, for example, wheat and maize exports were both substantially above the high 1969 levels, and with a notable decline in imports as well, net exports have risen further. Bulgaria's exports of both wheat and maize were reduced by 11 and 16 percent, respectively, but the reduction of wheat imports from 400 000 tons to only 50 000 tons and the virtual elimination of those of maize have resulted in an increase in net exports.

For sugar, the exports of Czechoslovakia and Poland, the two largest exporting countries, were increased while those of Romania were reduced by 60 percent. Czechoslovakian imports, consisting primarily of Cuban sugar, rose sharply, and most other countries also took larger amounts.

Incomes in agriculture

Information on incomes of the agricultural population is sketchy, but on the whole there seems to have been little improvement in 1970. Only in Hungary was the increase in agricultural income — about 12 percent, in spite of the reduction in agricultural output — considerably greater than the rise in other sectors (7 percent) [Table II-8]. According to official estimates, the earlier gap between agricultural income and nonfarm wage income has been virtually eliminated.

In Czechoslovakia, where the total cash income of the population (including pensions and social benefits) expanded at the anticipated rate of 4 percent, total income from agricultural activities increased by only 1.6 percent, compared with 3.9 percent for total nonagricultural income. This is in contrast with 1969, when the difference in the two growth rates was rather small, and 1968 and 1967, when agricultural income grew considerably faster than total wages (Table II-9). Agricultural income in Poland, which had fallen 9 percent in 1969, is reported not to have risen appreciably in 1970. Total incomes in cash and kind in Romania fell in spite of an increase in the payments to members of the cooperatives from reserve funds of collective and state farms. Indications are that farm income in Bulgaria rose in 1970, but since there was no increase in either 1968 or 1969 it seems certain that, for the period 1966-70 as a whole, it remained markedly below the medium-plan target, while nonagricultural wage income did better than expected.

TABLE II-8. – HUNGARY: MONEY INCOMES OF THE POPULATION

	1969	Annual change		
		1968	1969	1970 [1]
	1 000 million forints	..... *Percent*		
TOTAL	181.8	7.8	9.1	9.0
Wages	101.2	6.1	10.0	7.0
Income from agriculture	30.9	12.2	8.2	12.0
Income in nonagricultural private sector	9.3	6.4	2.6	...
Social benefits	19.3	9.4	9.2	15.0
Other incomes	10.5	14.4	12.8	...

[1] Preliminary estimates.

TABLE II-9. – CZECHOSLOVAKIA: CHANGES IN CASH INCOMES OF THE POPULATION

	1966	1967	1968	1969	1970
	..... *Percent per year*				
TOTAL	5.7	7.4	11.9	11.4	4.0
Wages	5.3	7.1	10.9	9.9	3.9
Income from agriculture	4.0	10.8	13.1	8.3	1.6
Pensions and social benefits	4.5	4.7	15.4	21.9	7.6
Other incomes	12.6	11.8	12.5	5.1	...

Agricultural policies

There were few significant changes in agricultural policies or in institutional arrangements in 1970. The main emphasis in most countries was on efforts to implement and improve policies which had been adopted in recent years. The new five-year plan (1971-75) of the U.S.S.R. is evolutionary rather than radical in approach.

Concentration and specialization of production and the development of more advanced forms of vertical integration have a high priority everywhere in eastern Europe, and are likely to become the central policy issue in 1971-75 plans. In several countries, particularly Czechoslovakia, Hungary, Romania and the U.S.S.R., the development of large-scale "combinates" is regarded as the most promising way to solve the meat problem, but similar organizational forms are also emerging in other subsectors of agriculture. The new forms of vertical integration link together in an organic way production, distribution and marketing activities. In this respect they strongly contrast with the earlier system, inherited from the U.S.S.R. model, which was based on a horizontal stratification of economic sectors (such as different levels of processing and distribution) between which the central planning administration was

virtually the only connexion. They are expected to help make planning easier and more effective, an important aim of the recent economic reforms.

Along these policy lines, a large-scale concentration and specialization scheme was introduced in 1970 in Bulgaria, under which 1 063 state and cooperative farms will be gradually amalgamated into 155 complexes of agriculture and associated industries already in process of establishment. Similarly, about 1 300 market gardens are to be grouped into 53 market gardening complexes, each with an area of 500 to 1 000 hectares. During the coming five-year period total output of vegetables in the country is to be concentrated in some 70 to 80 large units run on an industrial basis.

In Romania, where economic reforms started later than in other countries of the region, it has been decided to establish special enterprises for mechanization, their implementation starting in January 1971. The new units, which are expected to function on profit principles, will be in charge of subsidiary machine stations attached to collective farms. They will have their own equipment, and will also be responsible for maintenance of the equipment owned by collective farms. Romania also introduced in 1970 a guaranteed minimum income for the members of collective farms, uniform prices for industrial goods sold to cooperative and state farms, and reductions in the prices of farm machinery and other requisites. These measures should result in an estimated annual saving of 540 million lei to collective farms and 18 million lei to individual private farmers.

As in earlier years efforts to strengthen the technical base of agriculture continued in all countries of the region. Supplies of fertilizers increased everywhere, as did the number of tractors and combine harvesters. In all countries for which information is available fixed investment in agriculture has increased. In the longer term, the available data indicate that the share of agriculture in total fixed investment rose between 1961-65 and 1966-70 in Poland (from 14 to 16 percent), in the U.S.S.R. (from 16 to 18 percent), and in the German Democratic Republic (from 13 to 15 percent), but decreased in other countries of the region.

The new U.S.S.R. five-year plan

Like its predecessor, the 1971-75 five-year plan is based on a more realistic appraisal of possibilities than was often the case in the past. The planned increase in agricultural production is 20 to 22 percent, the same as was actually achieved in 1966-70, and less than the 25 percent target for those years. Within a total increase in investment of 40 percent, agricultural investment is to go up by 60 percent. Integration within the sector (with better forecasting and feedback based on the study of demand) should be made more effective by proposals to improve planning administration.

In the new plan the proposed increase in output of cereals is the key to success, because of the heavy requirements for feedgrains. To attain the new plan average of 195 million tons of grain a year and an end of period output of between 205 and 210 million tons[4] calls for a yield increase of 30 percent over the 1966-70 average. This is to be achieved by increasing inputs of fertilizers and machinery, extending irrigation, and by better organization of labour and land. On irrigated land in southern Ukraine, northern Caucasus and the Volga region, large specialized grain farms of 3 000 to 4 000 hectares are to be set up to produce for the State. Grain output under irrigation is to increase from 4.3 million tons in 1969 to 12 million tons in 1975. The main emphasis will be on wheat, but other cereals are also to increase: rice output is expected to double, to 2 million tons, maize to rise from 12 to 20 million tons, and the growing of rye (the area under which fell from 16 to 9 million hectares between 1965 and 1969) is to be revived.

Output targets for potatoes, fruit and vegetables have not been formulated but planned increases in state collections amount to about 40 percent, except for fruit and grapes for which the projected rise is over 70 percent. Cotton production, which exceeded previously planned output, will be expanded further by putting an additional 650 000 hectares of new irrigated land under the crop. State collections of flax are to rise from an annual average of 421 000 tons in 1966-70 to 520 000 tons in 1975, of sugar beet from 74.4 to 82 million tons, and of sunflowerseed from 4.7 to 5.9 million tons.

Although livestock production exceeded the level planned for the period 1966-70 as a whole, falling rates of growth in the last three years of the plan have caused dissatisfaction.[5] In the main, the slow progress in livestock production reflects the lack of feed. The yield of fodder crops has remained low and state deliveries of compound feeds inadequate. The consequently unbalanced diets and uneconomical feeding rates have resulted in long and costly fattening periods, which have caused some kolkhozes and sovkhozes to abandon certain forms of animal production. Price rises announced in March 1970 are expected to reverse this trend. In addition to higher unit prices, well-fattened calves now attract premiums of 35 to 50 percent, and deliveries in excess of compulsory targets are paid an additional 50 per-

[4] L.I. Breznev, speaking at the July 1970 Plenum of the Central Committee of the Communist Party.
[5] See *The state of food and agriculture 1970*. p. 52-53.

TABLE II-10. – U.S.S.R.: AGRICULTURAL PRODUCTION IN 1961-65 AND 1966-70, AND 1971-75 DEVELOPMENT PLAN TARGETS

(actual and planned annual averages)

	1961-65 actual	1966-70 plan	1966-70 actual	1971-75 plan	1975 target [1]
	Million tons				
Cereals (incl. pulses)	130.3	167.0	167.5	195.0	205.0—210.0
Potatoes	81.6	100.0	94.8	...	...
Vegetables	16.9	21.6	19.3	...	...
Cotton	5.0	5.6—6.0	6.1	6.7	7.0—7.2
Sugar beet	59.2	80.0	81.0	...	...
Sunflowerseed	5.1	6.0	6.4	...	...
Meat	9.3	11.0	11.6	14.3	15.6
Milk	64.7	78.0	80.5	92.3	98.0
	Thousand million units				
Eggs	28.7	34.0	35.8	46.7	51.0
	Thousand tons				
Wool	362.0	391.0	397.0	464.0	...

[1] From a statement by L.I. Brezhev on 2 July 1970.

cent. Farmers have been exhorted to use the extra income for additional equipment to put output gains on a sound permanent basis. All the same, 1971-75 plan targets are cautious (Table II-10). Estimated increases (not included in the plan) are from 99 million head of cattle on 1 January 1971 to 109 million by 1975, from 143 to 165 million head of sheep and goats, and from 67 to 74 million pigs. The biggest increases are to take place in Kazakhstan, Siberia, the Volga and southern Ural regions and central Asia. By 1975 feed requirements will rise by 50 percent to between 450 and 460 million tons (conventional units). To meet this target there are to be large reclamation works on pasture and meadow lands, and measures to raise yields, as well as an increase in the supply of compound feeds from the state industry to 30 million tons by 1975. Large specialized enterprises which have contributed increasingly to the supply of eggs and poultry are being cautiously encouraged.

Crop production has been held back by inadequate supplies of machinery and fertilizers and slow progress in land reclamation, compounded by mismanagement and waste on farms. The stress is not only on more, but on better use of technical resources. The new plan target for tractors is 1.7 million units, compared with the 1966-70 target of 1.8 million and actual delivery of under 1.5 million. The corresponding figures for combine harvesters are 541 000, 550 000 and 469 000. The truck target is the same as in 1966-70, 1.1 million units, against which only 717 000 were delivered. Out of a total mineral fertilizer production of 90 million tons, the supply to agriculture is to increase to 72 million tons by 1975, compared with the 1970 target of 55 million and actual delivery of 46 million tons.

Irrigation, which in 1966-70 was extended by 1.8 million hectares (compared with a target of 2.5 to 3 million), is to expand by a further 3 million to a total of 14 million hectares. The area of watered pasture is to be expanded to 41 million hectares, and 5 million hectares are to be reclaimed in zones of surplus moisture.

Between 1965 and 1970 the wages of labour on collective farms rose by 42 percent, compared with 26 percent for industrial and office workers. The same relative trends are to continue under the new plan, since wages on collective farms are to rise by 30 to 35 percent to 98 roubles a month, and those of other workers by 20 to 22 percent to 146-149 roubles a month. While the cash wages of collective workers thus remain lower, they have an additional source of income from family plots.

Total state investment in agriculture in 1971-75 is expected to rise to 82 200 million roubles, and that of kolkhozes to 46 400 million roubles, making for a total increase in investment of 57 percent. The State will also invest 29 300 million roubles (compared with 17 800 million in 1966-70) in industries supplying agricultural requisites. By this means, and through more efficient investment and organization, labour productivity is expected to increase by 37 to 40 percent by 1975.

North America

After two years of rapid growth economic activity in North America slowed down in 1970 following anti-inflationary measures applied in 1969 and early 1970. In the United States real output was down slightly, largely because of a strike in the automobile industry toward the end of the year. Unemployment increased steadily through 1970, stabilizing during the first quarter of 1971 at about 5 million persons (on a seasonally adjusted basis). This represents some 6 percent of the labour force, the highest level since 1961. Progress against inflation was nevertheless slow. Consumer prices increased by almost 6 percent, although there was some evidence of a slowdown during the latter part of 1970. All the same the trade balance improved substantially, reflecting a sharp increase in exports, particularly of

agricultural products. This was, however, more than offset by the increased outflow of private long-term capital and a sharp shift in the flow of private liquid funds from abroad, from an $8 690 million net inflow in 1969 to a $6 220 million net outflow in 1970. Overall, the United States lost almost $10 000 million in liquidity in 1970. Its real output recovered substantially in 1971 — a 3 percent increase in GNP is expected — and some progress was made in the fight against inflation. In the course of the year, however, the country's trade balance also turned negative, and in an effort to strengthen the international position of the dollar, a package of drastic economic policy measures was announced in August, including a 3-month voluntary price and wage freeze, a 10 percent import surcharge, and the discontinuation of the gold convertibility of the dollar, which in effect made it a floating currency *vis-à-vis* most other major currencies.

In Canada, growth slowed down during 1970, but developments during the fourth quarter indicated a strengthening of consumer demand, a sharp increase in government spending and a rise in residential construction; for the year as a whole GNP was some 3 percent higher than in 1969. Unemployment remained high, however, and the pressure on prices strong, although a decline in the rate of increase of consumer prices toward the end of the year brought the increase for 1970 below that in 1969. A sharp rise in exports and a large capital inflow resulted in a rapid expansion in foreign exchange holdings, which contributed to the decision in May 1970 to effect a *de facto* revaluation of the Canadian dollar. In 1971, the economic growth has accelerated further, and unemployment, although still high, has been somewhat reduced. For the year as a whole, the real GNP is expected to be up by nearly 5 percent.

Agricultural production in North America is estimated to have remained unchanged in 1970. Agricultural exports recovered sharply after three successive declines, reflecting a large increase in sales of wheat, coarse grains and vegetable oils. Farm income was lower in both countries, in Canada primarily because of reduced earnings from wheat and in the United States because of a sharp rise in the prices of farm inputs. Although reduced production and increased exports during the 1970 crop year brought wheat stocks down in both countries, government policy continued to be directed toward restraining output, although less drastically than in 1970.

Agricultural production

Efforts by the Canadian and United States Governments to restrain agricultural production were largely responsible in 1970 for the unchanged level of agricultural output in the region (Table II-11).

TABLE II-11. – NORTH AMERICA: INDICES OF AGRICULTURAL PRODUCTION

	1966	1967	1968	1969	1970[1]	Change 1969 to 1970	Per caput agricultural production in 1970
	1952-56 average = 100					*Percent*	*1952-56 average = 100*
Canada	144	123	135	135	123	— 9	88
United States	118	124	125	123	124	+ 1	99
REGION	120	124	126	125	124	—	98

[1] Preliminary estimates.

In the United States there was a fractional increase, as a 4 percent fall in crop production was virtually offset by a rise in the livestock sector. Despite record yields the wheat harvest was 6 percent smaller than in 1969, owing to the reduced national wheat allotment and the acreage diversion programme (see below). The acreage allotment for rice had also been reduced by 15 percent in view of declining export demand, and the crop was smaller by 9 percent. The allotment for 1971 has been left unchanged.

Feedgrain production in the United States declined 9 percent from the near-record level of 1969. Maize, down by 10 percent because of corn leaf blight and drought, accounted for most of this reduction, but sorghum, barley and oats harvests were smaller also. The average yields of feedgrains were down by 13 percent, the sharpest drop in 20 years. The cotton harvest was slightly larger, although not fully recovering from the 1969 fall. A 7 percent increase, more than enough to make up the 1969 reduction, was recorded for sugar in response to rising demand (in part because of the cyclamate scare) and the temporary interruption of imports due to strikes. Among other major crops, the soybean harvest was a little above the 1969 level, again reaching a new record, while tobacco production showed a further 6 percent rise.

Livestock production in the United States followed the previous years' trends. Beef and veal production increased by 6 percent, and also the output of mutton and lamb rose moderately. The most notable development was a sharp cyclical rise in pig slaughter. In the dairy sector, the long-term decline in cow numbers slowed down, and with rising output per cow total milk production slightly exceeded the 1969 output.

The FAO index of total agricultural production for Canada fell by 9 percent in 1970 as output responded to government policy measures directed toward eliminating wheat surpluses (see below). The wheat

harvest was down by more than half, following a 50 percent reduction in area to 5.1 million hectares, the smallest since 1914, and slightly reduced yields.

About two thirds of the land not sown to wheat was left as summer fallow, and most of the rest was shifted to feedgrains and oilseeds. With yields also higher than in 1969, barley and mixed grain production increased by 10 and 13 percent respectively, and the maize crop was 37 percent above that of 1969. The shift of wheat land to oilseeds gave a boost to the rising trend of output evident over the better part of a decade. Production of rapeseed rose by 113 percent and linseed by 78 percent. Soybean production also reached a new record.

The consumption of beef and veal in Canada continued to rise while production, which in 1970 remained unchanged, is slowly dropping behind. Pig and poultry continued to show increases, but lamb and mutton production has remained stable since 1967. Milk production declined and surplus stocks were reduced.

The relaxation of the efforts to constrain production in the face of the changed supply situation is clearly evident in the preliminary 1971 data on agricultural production in the two countries. In each case, the FAO indices show sharp increases to new record levels, by 8 percent for the United States and by 19 percent for Canada.

In the United States, the production of virtually all major crops, with the exception of linseed, oats, potatoes and tobacco, was up and new record levels of output were reached, according to September estimates, in the case of maize (up by 29 percent), sorghum (26 percent), wheat (18 percent), barley (14 percent) and soybeans (4 percent). The extent to which the changes in farm legislation introduced in 1970 were responsible for these increases cannot yet be stated with any certainty. The greater freedom of choice regarding crops planted on the areas remaining after the "set-asides" may, however, have been one of the reasons for the notably large increases in maize and sorghum. Other factors include high feed prices at time of planting, efforts to avoid repetition of last year's losses to corn leaf blight (so far reported to have done only limited damage this year), and weather favourable for maize. In the livestock sector, dairy production was estimated to be up by about 1 percent, and the reduction in cow numbers at midyear, also about 1 percent, was the smallest for the last 15 years. There has therefore been some amount of stock accumulation, and the country has again appeared as a commercial butter exporter in recent months. Little change was apparent in meat production, except for some reduction in output of pigmeat.

The very large increase of total production in Canada in 1971 reflects to a large extent a steep, although still only partial, recovery in the output of wheat (up by over 50 percent), following the abolition of the exceptional acreage diversion measures of 1970, and a further increase by more than half in the production of barley. Also the maize harvest is estimated to have expanded further, by over a tenth. Among oilseeds, there was a large reduction in the linseed output, but that of rapeseed continued to increase rapidly, rising by nearly half. Milk production in Canada was reduced by some 5 percent, but that of meat was likely to be larger, with poultry and pigmeat continuing to expand and beef and veal also sharing some recovery after two years of stable output.

Fishery production

Fish production in the United States was substantially higher in 1970 than in 1969 and although production in Canada was slightly lower the total for the region as a whole was up by 6 percent. Catches of high-value species such as salmon and, in the case of the United States, shrimp and tuna, were particularly good, and also the catch of raw material fish for the reduction industry was moderately larger than the year before.

The output of the processing industry in the United States was larger for nearly all important products, especially fish sticks and portions, and canned products. In Canada the production of canned salmon was above the average for recent years, but that of most groundfish products was below the 1969 level.

The growing evidence of overfishing prompted both countries to negotiate agreements on fishing privileges, between themselves and with other countries which fish off North America. Canada declared additional areas subject to national resources management measures and expanded restrictions on inputs in certain fisheries. Canada is also taking action to improve the earnings of primary producers. Price stabilization programmes for some products were continued, and a deficiency payment scheme introduced in 1969 to assist the salt cod industry remained in force. Early in 1970 the Parliament passed the Salt Fish Act which provides for a public corporation to market cured fish in an orderly manner, and to increase trade in these products.

Forest production

The North American forest products market in 1970 was influenced by the continued slump in the construction sector and the general economic slowdown in the United States. Housing construction was held back by high interest rates and shortage

of credit during much of the year, but with the easing of these restrictions toward the end of the period there were clear signs of an upturn in building activity and demand for construction materials, including sawnwood. Nonetheless, over the whole of 1970 production of sawn softwood in North America fell by 2 percent and sawn hardwood by 5 percent. Output of plywood is also estimated to have fallen, while that of fibreboard remained unchanged — lower production of insulation board offset an increase of hardboard — and growth in the particle board sector slowed down.

North American production of wood pulp in 1970 remained near the 1969 level. An output loss of about 400 000 tons was caused by pulp mill strikes in mid-1970 in British Columbia, but the 1.5 percent fall in Canadian output was counterbalanced by a small increase in the United States, most of which was exported. Production of most grades of paper and paperboard was down slightly in 1970 from the record 1969 level.

Because of the slack demand from industry, industrial roundwood removals in North America are estimated to have declined slightly in 1970, and log prices were generally under pressure. In the United States, lower domestic demand for coniferous logs was partly offset by increased buying from Japan.

TABLE II-12. – NORTH AMERICA: INDICES OF VALUE OF EXPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	Share of total agricultural exports in 1970	1966	1967	1968	1969	1970 [1]	Change 1969 to 1970
	Percent	*1957-59 average = 100*					*Percent*
AGRICULTURAL PRODUCTS	64	170	151	146	133	170	+ 28
Food and feedstuffs	55	202	174	165	152	203	+ 33
Cereals	30	217	176	161	132	173	+ 31
Soybeans and oil	12	247	255	260	263	396	+ 51
Beverages and tobacco	5	137	144	153	158	143	— 10
Tobacco	5	137	144	153	158	143	— 9
Raw materials	4	65	66	67	45	55	+ 23
Cotton	3	60	65	64	39	39	+ 33
FISHERY PRODUCTS	3	151	159	161	192	204	+ 6
FOREST PRODUCTS	33	148	154	179	202	214	+ 6
Sawnwood	8	143	145	181	197	200	+ 1
Pulp and paper	21	140	142	156	181	195	+ 8
Agricultural, fishery and forest products	100	164	152	155	154	183	+ 19

[1] Preliminary estimates.

Trade in agricultural, fishery and forest products

North American agricultural exports recovered sharply in 1970, reflecting a large increase in sales of wheat, coarse grains and soybean oil. Canada's earnings rose by 40 percent and those of the United States by 21 percent, raising the total for the region to a level almost 30 percent above that of 1969, to the peak achieved four years earlier (Table II-12). This increase raised the combined earnings from agricultural, fishery and forest exports to a record level almost 20 percent above 1969, although the rise in value of fishery and forest exports was smaller than the previous year.

Increased earnings for agricultural products were primarily due to larger shipments. Those of barley quintupled, cotton rose by about 25 percent and soybeans, soybean oil, powdered milk and wheat by 40 to 50 percent. The overall price level showed little change but in a number of cases substantial price increases also contributed to the rise in value of exports, namely maize and sorghum (for which shipments had actually declined), and soybean oil and powdered milk.

Exports of grain from both Canada and the United States, which had declined every year since 1966, were stimulated in 1970 by reduced levels of production and stocks in Australia, Argentina and western Europe and by growing demand for livestock feed. United States shipments to Europe itself were larger, as were those to a number of countries which in 1969 had purchased European wheat. Compared to 1969, the volume of wheat exports from the United States rose by 50 percent, those of barley were eight times and oats more than fifteen times as large, in all three cases bringing shipments back to levels of a few years earlier. Both maize and rice exports were lower, in the first case because of reduced supplies and in the second because of falling demand on world import markets. Canadian exports of wheat and wheat flour also recovered in 1970, and although they did not return to the peak levels of 1964-66 they were large enough to strain port and elevator facilities to the point that in mid-1970 a moratorium was declared on barley exports. There were substantially larger shipments to the centrally planned countries (including mainland China), which because of their increasing importance as purchasers of Canadian wheat had been mainly responsible for the downward trend since 1966. Canadian grain sales in 1970 were also stimulated by the programme of "expanded credit" begun in July 1969 to promote sales of Canadian wheat on liberal terms to developing countries which have taken only token amounts in the past.

In contrast to grains, shipments of oils and oilseeds from the region had risen steadily since 1966,

and in 1970 were some 42 percent larger than the previous year. With generally higher prices, the value of exports rose by 51 percent. Earnings from soybeans and soybean oil, primarily from the United States, rose sharply (by 51 percent) and there were substantial reductions in stocks. Import demand was exceptionally strong in both western Europe and Japan in the face of a continued world shortage of a number of competing oils and meals. For Canada, there was a substantial increase in exports of rapeseed and rapeseed oil, following the record harvest of late 1969.

Exports of soybean oilcake and meal from the region, which have shown exceptionally strong growth over the past decade, also rose sharply (by almost 25 percent) in 1970 to a level some five times that of 1960. With prices higher, earnings increased by 26 percent. This expansion has been stimulated not only by the steadily increasing demand for livestock feed, but also by relatively high feedgrain prices in 1970.

Of the two important nonfood exports, cotton and tobacco, the first recovered sharply from the low level of 1969 but still remained some 35 percent lower than the average of the past decade. Prices were higher, but most of the increase was due to larger shipments stimulated by smaller availability from a number of other countries, low stock levels and increasing consumption in a number of Asian countries. Exports of tobacco by both Canada and the United States were smaller in 1970. The latter's exports to western Europe were down by about 20 percent in volume, because of increased competition from other suppliers and lower sales to its principal customer, the United Kingdom, because of uncertainty over the entry of this country into EEC. Exports to the Federal Republic of Germany were also lower but those to Japan, the third largest market, rose by over 40 percent after declining in 1969.

The value of United States exports of agricultural commodities on concessional terms decreased in 1970 for the fifth year in a row, and was almost 6 percent less than in 1969 (Table II-13). Improved grain supplies in developing countries have greatly reduced the need for food aid shipments, and while a moderately larger volume of wheat was shipped under government-financed programmes, principally to India, Pakistan, the Republic of Korea, and Turkey, the amount of feedgrains, rice and dairy products was reduced. Public Law 480 shipments of cotton were increased. Most of the decline in concessional shipments was in local currency sales, which have been diminishing since the shift away from such sales was ordered by the United States Congress in 1968. In total, concessional exports amounted in 1970 to only 13 percent of all United States agricultural exports, compared to 17 percent in 1969 and between 30 and 35 percent from the initiation of the programme in 1954 up to 1961.

TABLE II-13. – UNITED STATES: AGRICULTURAL EXPORTS, CONCESSIONAL AND COMMERCIAL

	1961-65 average	1967	1968	1969	1970
	..... *Million U.S. dollars*				
CONCESSIONAL EXPORTS					
Public Law 480					
Foreign currency sales. .	1 035	736	540	337	266
Dollar credit sales . . .	69	194	384	426	436
Donations	253	287	251	156	155
Barter [1]	83	13	3	...	...
TOTAL EXPORTS UNDER PL 480	1 440	1 230	1 178	...	...
MUTUAL SECURITY, AID .	55	33	11	...	...
TOTAL CONCESSIONAL .	1 495	1 263	1 189	1 019	957
COMMERCIAL EXPORTS [2] .	4 148	5 117	5 039	4 917	6 217
TOTAL AGRICULTURAL EXPORTS	5 644	6 380	6 228	5 936	7 174
	..... *Percent*				
Concessional as percentage of total	26	20	19	17	13

[1] Excludes barter for overseas procurement for United States Government agencies. – [2] Commercial exports include in addition to unassisted commercial transactions shipments of some commodities with government assistance in the form of short- and medium-term credit, export payments or sales of government-owned commodities at less than domestic market prices.

The region's imports of agricultural products increased only very slightly in 1970, with lower imports of sugar, coffee and raw materials offset by larger purchases of cocoa, wine, meat (particularly beef and veal) and live cattle (Table II-14). Large Canadian reexports of Australian and Argentinian meat to the United States resulted, in mid-1970, in an agreement between the two countries to impose limitations, and a suggestion was made early in 1971 to put a similar restriction on hog imports, which in 1970 were almost four times as large as the previous year.

Although the value of the region's fishery exports grew somewhat less rapidly in 1970 than the previous year, the 6 percent increase was still substantial. Prices were for the most part higher, but the reduced volume of shipments of some products, including cured and some canned products, prevented a larger increase in earnings. Canada, which accounts for some 75 percent of the value of all regional fishery exports, and which exports some 70 percent

TABLE II-14. – NORTH AMERICA: INDICES OF THE VOLUME OF IMPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	Share of total agricultural imports in 1970	1966	1967	1968	1969	1970 [1]	Change 1969 to 1970
	Percent	*1957-59 average = 100*					*Percent*
AGRICULTURAL PRODUCTS	62	112	113	124	115	117	+ 1
Food and feedstuffs	30	123	130	139	141	147	+ 4
Sugar	(8)	97	108	113	110	108	— 2
Meat	(10)	187	203	224	247	268	+ 8
Beverages and tobacco	24	112	110	123	104	105	+ 1
Coffee	(16)	104	102	120	97	94	— 3
Raw materials	8	86	83	92	88	81	— 7
Wool	(1)	91	63	83	63	51	— 19
Rubber	(5)	84	88	103	107	106	— 1
FISHERY PRODUCTS	7	158	160	186	168	186	+ 11
FOREST PRODUCTS	31	150	146	162	175	164	— 6
Sawnwood	(7)	141	143	164	170	158	— 7
Pulp and paper	(18)	143	136	140	153	147	— 4
Agricultural, fishery and forest products	100	124	124	136	133	132	— 1

[1] Preliminary estimates.

of its output (in value terms), succeeded in boosting sales to the United States, its principal market.

In the United States, imports of fishery products reached the record level of $962 million in 1970; prices were higher and, with the exception of canned tuna, canned shellfish and cured products, the quantity imported was also larger. This increase more than offset the sharp decline in fish meal purchases for the second year in a row, as feed mixers increasingly substituted less expensive competitive components. Large imports and high domestic production of shrimp led to a price decline in midyear at producer and wholesale levels. Stable retail prices and a resumption of the upward trend in all prices early in 1971 were proof, however, that the United States shrimp market, which is supplied by a very large number of developing countries, remained sound.

As in the case of fishery products, the value of exports of forest products increased at a somewhat slower although still substantial rate in 1970. North American coniferous log exports rose by nearly one fifth in 1970, under the impetus of a strong revival of Japanese interest in United States coniferous logs. Canadian pulpwood exports (as roundwood) to western Europe also increased appreciably, and there was a further expansion in the shipment of pulpwood chips from the west coast of North America to Japan. In face of weak domestic demand and strong markets in western Europe and Japan during much of the year, United States exports of chemical pulp (both market pulp and surpluses from integrated mills) rose appreciably. North American trade in newsprint, which is largely between Canada and the United States, fell slightly, but there was further substantial growth in exports of other paper and paperboard. Intraregional trade of sawn softwood also declined in 1970 due to the weaknesses of the United States construction market, but exports, chiefly to western Europe and Japan, rose strongly, led by a notable recovery in Canadian shipments to the United Kingdom.

North American imports of sawn hardwood, plywood and veneers and fibreboard fell in 1970, seriously affecting Asian suppliers of tropical species. United States imports of Canadian sawn hardwood and Finnish plywood were also reduced.

Agricultural prices and incomes

Reflecting the much reduced wheat crop, net farm income in Canada (Table II-15) is estimated to have dropped in 1970 to less than 55 percent of the 1969 level, or approximately the level of 1961 which was the lowest since 1945. With the liquidation of much of the carryover stocks, however, the drop in *realized* net income was limited to about 12 percent, and total cash receipts are estimated to have been only slightly below the previous year. Cash advances and payments from the Canadian Wheat Board were sharply curtailed, but receipts from livestock reached a record level, with an important contribu-

TABLE II-15. – NORTH AMERICA: ESTIMATED FARM INCOME

	Canada			United States		
	1968	1969	1970 [1]	1968	1969	1970 [1]
	Thousand million Can. dollars			*Thousand million U.S. dollars*		
Cash receipts from farm marketings	4.4	4.2	4.1	44.4	47.2	48.7
Government payments				3.5	3.8	3.7
Income in kind	0.5	0.6	0.7	3.3	3.6	3.8
Net change in farm inventories	+0.2	+0.3	— 0.3	—0.1	+0.4	+ 0.5
GROSS FARM INCOME	5.1	5.1	4.5	51.1	55.0	56.7
Production expenses	3.4	3.4	3.6	36.4	38.4	40.4
NET FARM INCOME	1.7	1.7	0.9	14.7	16.6	16.3
REALIZED NET FARM INCOME	1.5	1.4	1.2	14.8	16.2	15.8

[1] Preliminary.

tion from expanded pig production in the Prairie Provinces, while those from marketing of crops other than wheat showed a good recovery from the 1969 level. Production expenses again reached a record figure. Although expenditure on fertilizer purchases was about 13 percent lower, purchases of prepared feed, particularly for pigs, were substantially larger as also were wages and interest payments.

The index of prices received by farmers in 1970 averaged slightly below the 1969 level. Following a rise in 1969, it levelled off during the first part of 1970 and then moved down to a December level 5 percent below that of the previous year. The index of prices paid by farmers averaged higher and, in contrast to the index of prices received, continued its upward trend through the year.

In the United States, the total gross agricultural income (Table II-15) in 1970 was about 3 percent higher than the previous record level of 1969. The increase was, however, more than offset by higher production expenses (nearly all due to higher input prices) and net farm income is estimated to have totalled slightly below the 1969 figure. The total personal income of the farm population, however, was slightly higher than in 1969, with a 4 percent increase from nonfarm sources offsetting the decrease from farm sources. Moreover, with the continued reduction in the number of farms, net income per farm approximated the record level of 1969 and the disposable personal income per caput rose by about 8 percent.

The index of prices received by farmers in the United States increased by 1.9 percent, and that of prices paid by 4.6 percent. The former index, which had been moving upward since late 1967, reached a peak in the first quarter of 1970 and then moved downward because of declining livestock prices, particularly in the second half of the year. Crop prices, in contrast, stabilized during the first quarter and became stronger through the remainder of the year. The most important influence on crop prices was the reduced maize harvest. In addition, export demand, particularly for wheat and soybeans, was strong during the year. The index of prices paid continued its upward trend of recent years, with increases registered for all its component items.

Problems, policies and programmes

WHEAT PRODUCTION AND STOCKS

The combination of reduced production and increased exports brought about an important reduction in North American wheat stocks during the 1970/71 season (Table II-16). Productive capacity remains significantly in excess of foreseeable market

TABLE II-16. – NORTH AMERICA: SUPPLY AND UTILIZATION OF WHEAT [1]

	Canada			United States		
	1968/69	1969/70	1970/71 [2]	1968/69	1969/70	1970/71 [2]
	Million metric tons					
Beginning stocks	18.1	23.2	27.5	14.7	22.3	24.1
Production	17.7	18.6	9.0	42.9	39.7	37.5
Domestic use	4.3	4.9	4.8	20.5	21.4	22.3
Exports [3]	8.3	9.4	11.0	14.8	16.5	19.8
Ending stocks	23.2	27.5	20.7	22.3	24.1	19.5

[1] August-July season for Canada; July-June season for the United States. – [2] Preliminary estimates. – [3] Includes wheat equivalent of wheat flour.

requirements, however, and government efforts to restrain output are being continued.

Canadian production was reduced to less than half of the 1969 level by the Government's Operation LIFT (Lower Inventories for Tomorrow).[6] Approximately 5.1 million hectares, equivalent to half the 1969 area, were diverted from wheat production under this programme. In the United States, area under wheat was reduced by 1.6 million hectares to 17.9 million in response to a reduction in the national wheat allotment and an acreage diversion programme. Although the national average yield again reached a record level (2.1 tons per hectare), total output was 6 percent less than in 1969.

Both countries benefited from the larger world wheat import demand (see Chapter I). Exports from Canada are estimated to have reached a record level and were reported as moving, during much of the season, at near maximum capacity for available internal transportation and export handling facilities. United States exports were also notably higher than during the two previous seasons, with commercial sales accounting for most of the increase.

Although Canadian wheat stocks remain larger than is considered necessary for normal purposes, the 1970 Operation LIFT is not being repeated. Instead the Government has proposed a comprehensive, longer term prairie grains policy, which includes a grains receipts stabilization plan. In the meantime, in March 1971 the Government announced guidelines for the year's prairie grain crop. For wheat, these suggest some relaxation from the drastic measures of 1970/71, but the size of the crop is likely to be well below those of 1968/69 and 1969/70. The goal for the sown area has been set at a maximum of 8.1 million hectares, 3.2 million more than in 1970. The Wheat Board will accept at least 10.6 million tons of wheat, with probable minimum delivery quo-

[6] *The state of food and agriculture 1970*, p. 60.

tas for producers of 8 to 10 bushels per assigned acre. The initial payment will be $1.46 per bushel as in 1970 and for the first time this was announced in advance of spring seeding.

The Canadian Government has also offered prairie grain producers $10 per acre to divert land under crops and summer fallow to forage production. This programme is to continue for three years or until 1.6 million hectares have been diverted. In the crop year beginning 1 April 1971 the Government will also provide $10 million for expansion and intensification of its market development activities for the promotion of export sales of prairie grains and oilseeds.

The new Canadian Grain Act, which became effective 1 April 1971, is designed to give a greater degree of flexibility to the grain handling industry, and enable Canada to respond more rapidly to consumers' demands in the international market. The major feature of this legislation is the new set of wheat grades based on protein content rather than appearance, and new handling regulations which will enable the Wheat Board to meet customers' demands more rapidly.

In the United States the national wheat allotment, under the Agricultural Act of 1970 (see below), has been replaced with a domestic allotment scheme totalling 8 million hectares, the area considered necessary to produce sufficient wheat for domestic food use. Domestic marketing certificates will be issued on this basis, entitling farmers to receive direct payments under the programme. The value of these certificates will be equal to the difference between the national average price received by farmers during the first five months of the marketing season (rather than the price support loan level) and 100 percent of the 1 July parity price. The price support loan level continues, for the seventh consecutive season, at $1.25 per bushel (national average). Participants setting aside cropland equal to the required percentage of their domestic wheat allotment, and maintaining their conservation base, may plant all their remaining land to wheat or any other crop (except quota crops, which are limited by other programmes), without loss of certificates.

Canadian agriculture in the 1970s

The report of the Canadian Federal Task Force on Agriculture was released in May 1970 and examined by a second Canadian Agricultural Congress in November. The major themes of the report are: " that the Government should intelligently assist an orderly adjustment " of the farm sector and " that governments should reduce their direct involvement in agriculture thereby encouraging farmers, farm organizations and agribusiness to improve their management and leadership functions and stand more self-sufficiently on their own." The report explicitly assumes " that agriculture should be operated much as any other industry " but notes that this in no way implies " a reversion to anything approaching a simplistic laissez-faire system. The system . . . includes institutions such as national marketing boards, stabilization programmes, etc., and is compatible with a contemporary complex industrial society." [7]

The Task Force report has already been followed by a number of specific policy measures. Reference was made above to the new prairie grain policy. In addition, the Canadian Dairy Commission and the respective authorities of the provinces of Ontario and Quebec have agreed on a supply management programme for dairy production in these two provinces, which together produce 80 percent of the total Canadian supply. The objective of the plan is to keep milk production (on a butterfat basis) in balance with total domestic requirements. Sharply differentiated levies are imposed to finance the cost of disposal of surplus dairy products: $0.26 per 100 pounds of milk delivered within an historically based delivery quota, and $2.40 per 100 pounds delivered in excess of the quota.

In addition, a major agricultural adjustment and development programme has received Cabinet approval in principle, and is being discussed with provincial ministers of agriculture and leaders of major farm organizations. The programme aims at providing improved economic and social opportunities to farm people in all areas of Canada: " We want to give farmers who are close to retirement age the opportunity to use their assets to put together a satisfactory retirement package. We want to give other farmers the opportunity to withdraw from agriculture with a certain amount of dignity and security, if they choose to do so." [8]

New legislation in the United States

The Agricultural Act of 1970, enacted on 30 November 1970, provides the legislative basis for the 1971, 1972 and 1973 wheat, feedgrain and upland cotton programmes in the United States. Among its many other provisions the Act also extends the Agricultural Trade Development and Assistance Act of 1954 (Public Law 480), the National Wool Act of 1954, the long-term land retirement programmes (" Cropland Conversion " and " Greenspan "), and the milk market order provisions contained in the Food and Agriculture Act of 1965. In separate leg-

[7] From *Canadian Agriculture in the Seventies: Report of the Federal Task Force on Agriculture*. Ottawa. December 1969.
[8] Canada Department of Agriculture. Press Release. 17 February 1971.

islation, the Food Stamp Act was also extended and authority granted for a notable expansion of this programme.

This legislation continues the general trends that emerged in commodity programmes during the 1960s: voluntary programmes under which participants reduce their planted acreages and in return receive direct payments for compliance and nonrecourse price support loans; and a relatively low level for the nonrecourse price support loans, to provide insurance against disaster, without pricing United States production out of world markets. With these policies, the effect of price support loans has come to be one of stabilizing prices, not raising them. For the support of farm incomes the programmes have come to rely primarily on direct compliance payments to participants, rather than on the indirect effects of price support loans on market prices.

Commodity programmes under the new legislation are generally similar to those that have been in effect for the 1970 and previous seasons. Cropland diversion provisions consist of " set-asides " of a designated percentage of individual farm allotments and base acreages, plus maintenance of the traditional farm conservation bases. Compliance with these provisions entitles a farmer to receive direct payments, in the form of marketing certificates for wheat (already referred to briefly above), and of set-aside payments for feedgrains and upland cotton. The rate of the direct payments equals the difference between the national average price received by farmers during the first five months of the marketing season (rather than the price support loan level) and the guaranteed national average return (for wheat, 100 percent of 1 July parity price; for feedgrains $1.35 per bushel for maize and $1.24 per bushel for grain sorghum; and for upland cotton, 70 percent of 1 August parity price). The effective level of the nonrecourse price support loans remains unchanged for wheat ($1.25 per bushel national average) and maize ($1.05 per bushel average quality); has been raised for grain sorghum (to $1.73 per hundredweight) and lowered for the other feedgrains (barley 81 cents per bushel) and upland cotton (to 19.5 cents per pound for middling 1-inch).

In two ways, however, the 1971 commodity programmes mark an important departure from previous programmes. One is the greater freedom they allow for participants to change their patterns of production. After complying with the set-aside and conservation base requirements they are free to produce any crop they choose on their remaining acres, except those for which national quotas are in effect (rice, tobacco, groundnuts, extra-long staple cotton, and sugar). Second, the new legislation sets a ceiling (of $55 000) on the payments any farmer may receive under each of the three commodity programmes. Although the legislation provides that payments may be offered for voluntary diversion of cropland in excess of the required set-aside and the conservation base, there are none included in the 1971 programmes.

Forest policies

Government forest policies in North America have been heavily influenced recently by growing awareness of the possible consequences of further deterioration of the environment. In Canada and the United States new institutions have been or are being created with the aim of improving the quality of the environment. In the United States there are plans for the establishment of an Environmental Protection Agency and a National Oceanic and Atmospheric Administration in the Department of Commerce. A Council on Environmental Quality and an Advisory Committee on State and Private Forestry have already been created to advise the Department of Agriculture on matters relating to the protection, management and development of 149 million hectares of forest lands in private ownership. About 150 000 hectares of nonfederal land — almost exclusively privately owned — have been afforested. A bill has been passed creating a Youth Conservation Corps and authorizing a three-year pilot programme of $3.5 million to employ 3 000 youths from 16 to 18 years of age to work in national forests and parks.

In Canada, a major reorganization of the relevant departments was carried out in 1970 to allow the Minister of Fisheries and Forestry to take the lead in the improvement of the quality of the environment. A new Department for Renewable Resources and Environmental Affairs was established consisting of the former Department of Fisheries and Forestry and elements of other departments which relate to environmental work. A National Environmental Council will be constituted later. During 1970 the basis was established for a second national park in Newfoundland which will make an important ecological as well as recreational contribution to the national park system.

The need for forest policies which promote the conservation of the environment has also been fostered by the multidisciplinary approach to regional development. This is of particular concern to the pulp and paper industry, which is at present responsible for a substantial part of the pollution of rivers and streams in North America. There is evidence that settling basins and other treatment facilities are being installed in increasing numbers in both new and old mills, but more efforts of this nature will be needed before a satisfactory situation can be created.

Oceania

As in most other developed countries, inflationary pressures in Australia and New Zealand were strong in 1970. In New Zealand, the economic recovery from the 1967/68 recession continued, and the GNP in real terms rose by 5.5 percent. With an extremely tight labour market and heavy wage demands, however, money incomes increased much more rapidly and the cost of living index rose by some 6 percent. Partly as a result of this, and partly because of lower export and rising import prices the country's balance of payments, which had been expected to show a surplus, ended with a small deficit. In an effort to halt the wage/price spiral, the Government introduced in November 1970 a price freeze and subsequently, in February 1971, a 12-month wage control scheme — under which wage and salary increases are limited to a maximum of 7 percent — and controls over the profit margins of manufacturers and retailers. Economic activity has therefore slowed down, and although some mild stimulating measures were again applied in mid-1971, real GNP in 1971/72 is expected to grow only by some 3.0-3.5 percent.

Although inflation was of major concern also in Australia, its rate, at some 3.5 percent, was very much less than in New Zealand and only slightly more than the anticipated 3 percent. Nevertheless, various monetary policy measures were taken in 1970 to reduce the growth of demand, and more stringent actions were anticipated for 1971 in the face of increasing employment and rising wage demands. The GDP at constant prices increased in 1969/70 by 5.6 percent, rather less than the year before but well in line with the average for the past five years. Output in agriculture was reduced, and with the rapid growth of other sectors, particularly mining, the share of agriculture in total GDP has fallen rapidly and is now only some 7 to 8 percent. The fall in farm incomes is in part responsible for the reduction in the growth of GDP in 1970/71 to an estimated 4.5-5.0 percent.

The mining sector is making a major contribution to the country's exports, and in 1969/70 a growing volume of mineral — as well as cereal and meat — exports was a principal reason for the larger surplus of the balance of payments. The current account remains in deficit, however, and is made up by continuing large capital imports, although the role of imported capital is expected to diminish in the future as mineral exports increase.

Agricultural production

The combined agricultural production of Australia and New Zealand declined fractionally in 1970, reflecting slight declines in the output of both countries (Table II-17).

TABLE II-17. – OCEANIA: INDICES OF AGRICULTURAL PRODUCTION

	1966	1967	1968	1969	1970 [1]	Change 1969 to 1970	Per caput agricultural production in 1970 [1]
	1952-56 average = 100					*Percent*	*1952-56 average = 100*
Australia	154	141	171	166	164	— 1	118
New Zealand	145	151	157	160	158	— 1	117
REGION	152	143	167	164	162	— 1	115

[1] Preliminary estimates.

As a result of a 32 percent reduction of the planted wheat area in Australia in response to government policies (see below), and with yields only slightly above the level of the previous season, the 1970 wheat harvest of 7.5 million tons was some 27 percent less than in 1969. However, the impact of this reduction on the total index was to a very large extent offset by increases in many other commodities. With area shifted from wheat to other grains, and with trade prospects for coarse grains stimulated by the corn leaf blight in the United States, output of barley increased by 45 percent and maize by 17 percent, while the sorghum harvest recovered to more than double the low level of 1969. The total feedgrain crop, at 5.16 million tons, was thus 47 percent larger than in 1969. Rice yields were down steeply and production was slightly smaller than the record of the previous season, 256 000 tons, although the area was 19 percent larger. Raw sugar production, at 2.52 million tons, was 14 percent above the 1969 level.

The output of the Australian livestock sector fell slightly from the high level of 1969. Total meat production was fractionally higher, but milk production remained unchanged because of the reduced profitability of the dairy products markets (see below). The wool clip was slightly smaller.

Production in New Zealand remained virtually unchanged, mainly because of the effect of drought on a number of products. Wheat and barley harvests were down by 37 and 25 percent, respectively. Milk and butterfat production was also severely affected, declining by some 7 percent. In the meat sector, there was only a fractional rise in mutton and lamb production, but beef and veal output showed a large increase of nearly 6 percent and total meat production thus rose by some 3 percent. Much of the increase in beef production stems from an expansion in the meat operations of dairy farmers,

in response to government efforts in this direction, but traditional beef herds are also expanding. The wool clip remained unchanged at the stable level of recent years.

Preliminary indications for 1971 suggest a moderate recovery in overall production in both Australia and New Zealand. In Australia, the area under wheat was little changed from 1970 and, with average yields, a crop of some 8.0-8.5 million tons was expected, compared with 7.5 million the year before. Among other cereals, further increases were likely in barley, maize and rice, and although the sorghum harvest would probably be lower, total production of feedgrains was expected to show an increase over 1970. Another commodity group which has shown substantial increase following the reduction in wheat acreage is oilseeds, especially sunflower and rapeseed. Sugar production was estimated to be up by perhaps a tenth. In the livestock sector, cattle numbers reached a new record level, and beef and veal output may rise by some 5 percent. An increase is expected also for mutton and lamb, reflecting in part slaughterings because of the decision of many farmers to abandon sheep farming in view of the low wool prices. The wool clip, in fact, is estimated to have declined by a further 2 percent. Milk production also fell further.

In New Zealand, most major field crops, including wheat, barley and potatoes, as well as vegetables and fruit, recovered substantially from the drought-reduced levels of 1970, and meat production was up also, but the increase in total production was held back by a small reduction in dairy production and the continued stable level of the wool clip.

Trade in agricultural, fishery and forest products

The value of agricultural, fishery and forest exports from Oceania increased by some 6 percent in 1970. Reduced earnings from wool and dairy products were offset by larger income from wheat, sugar, beef and veal, and fishery and forest products. Australian exports of agricultural products were substantially higher, reflecting the country's position in world wheat and sugar trade, both of which expanded. New Zealand's earnings, on the other hand, fell, with trade in livestock products adversely affected by serious drought and by the sharp drop in wool prices on world markets (Table II-18).

The volume of Australian exports of both wheat and coarse grains increased by some 25 percent in 1970. Shipments of wheat were larger to the United Kingdom, and also to the Near East (notably the United Arab Republic) as a result of poor crops in much of that region, but the largest purchaser was mainland China, which took over 30 percent of the

TABLE II-18. – OCEANIA: INDICES OF VALUE OF EXPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	Share of total agricultural exports in 1970	1966	1967	1968	1969	1970 [1]	Change 1969 to 1970
	Percent	*1957-59 average = 100*					*Percent*
AGRICULTURAL PRODUCTS	95	132	138	121	141	150	+ 6
Food and feedstuffs	61	154	185	153	180	201	+ 12
Cereals	(15)	189	348	202	260	290	+ 11
Sugar	(6)	151	162	183	180	222	+ 23
Meat	(27)	174	169	171	218	254	+ 17
Dairy products	(8)	122	143	106	112	102	— 9
Raw materials	33	110	93	90	103	100	— 4
Wool	(33)	110	93	90	103	100	— 4
FISHERY PRODUCTS	2	258	277	385	421	437	+ 4
FOREST PRODUCTS [2]	3	195	221	317	372	394	+ 6
Agricultural, fishery and forest products	100	133	140	125	146	154	+ 6

[1] Preliminary estimates. – [2] Australia and New Zealand.

total during 1969/70 (December-November). The low level of maize output in the United States helped to stimulate demand for Australian soft wheat, and also for barley; shipments of the latter rose by one third and earnings by 20 percent. The production and export of feedgrains have increased not only because of favourable market opportunities (particularly in Japan, which is one of Australia's major customers for agricultural exports) but also because of the recent restrictions on wheat production.

Sugar exports — largely from Australia, but also from Fiji — were some 7 percent higher in volume and 23 percent in value, with both countries benefiting not only from higher world prices but also from ample production, which allowed them to share in the redistribution shortfalls under the International Sugar Agreement. Although the United Kingdom, other Commonwealth countries and the United States are important markets for Australian sugar, since 1965 Japan has become the largest single customer. However, its purchases are made at prices considerably below those paid by the other countries through preferential arrangements.

Earnings from meat exports were also larger, with Australia again the main beneficiary through an increase in its shipments of beef and veal (by 17 percent) and mutton and lamb (by 19 percent), both at higher prices. Higher prices also helped raise New Zealand's earnings from meat, despite smaller shipments of mutton and lamb.

Drought was also a principal reason for the losses suffered by New Zealand in dairy product markets.

World market prices improved, and while Australia was able to raise its export earnings from these products by some 17 percent, New Zealand's exports, particularly of butter, were smaller and their value was reduced.

As discussed in Chapter I, prices of wool on world markets declined sharply in 1970, and Oceania's wool earnings, which constitute some 33 percent of the value of all its agricultural exports combined, fell by about 4 percent. Australia was able to increase the volume of its shipments, although their value did not rise, but New Zealand, again as a result of drought, experienced a decline in both volume and value.

Potential impact of an enlarged EEC

Although the proportions of Australian and New Zealand exports that go to the United Kingdom have continued to decline (as has also the share of agricultural products in their total exports),[9] the United Kingdom remains an important export market for several of their major agricultural products. The possibility that United Kingdom entrance into the EEC might result in further restrictions on the access of their products to the United Kingdom market has therefore given rise to concern, especially in New Zealand. In 1969/70, this market took 90 percent of New Zealand's total exports of butter (value $98.7 million), 75 percent of its total exports of cheese ($33 million) and 75 percent of its total exports of lamb and mutton ($138.1 million). The three products together account for about one third of the value of New Zealand's exports.

Australia's nonagricultural exports have continued to increase rapidly and in 1969/70 approximated 50 percent of its total exports. Australia has also been notably more successful than New Zealand in developing alternative markets for most of its agricultural products and thereby reducing its dependence on the United Kingdom market, from over 30 percent in the 1950s to 15 percent in 1969/70. Nevertheless, in 1969/70 the United Kingdom took 69 percent of Australia's total exports of butter (value $36.4 million), 59 percent of its total exports of canned and dried fruits ($31.2 million), and 26 percent of its total exports of sugar ($30.7 million).

With respect to wool, the most important agricultural export from both countries to EEC, enlargement of EEC would not be expected to affect the conditions of access to the United Kingdom market as EEC wool imports are not at the moment subject to duty; in any case the present six-member Community actually takes a much larger part of Australia's and New Zealand's total wool exports than does the United Kingdom. For lamb and mutton, for which the United Kingdom market is especially important for New Zealand, and outlets elsewhere are limited, the EEC has not established a common market policy, and the access might be adversely affected if and when such a policy were to be established. For beef and veal, for which the EEC has a common market policy, the United Kingdom provides a relatively less important market for Australian and New Zealand exports and, in any case, world export demand prospects are agreed to be quite promising.

New Zealand concern about continued access to the United Kingdom market for its dairy products would appear to have been largely allayed by the arrangements negotiated between EEC and the United Kingdom.[10] These would guarantee continued access for specified minimum quantities of New Zealand butter and cheese during the five-year transitional period (envisaged as 1973 through 1977), at a gradually diminishing rate reaching by the end of the period 136 000 tons of butter (80 percent of the present quantity) and 15 000 tons of cheese (20 percent of the present quantity). The price level, however, would be guaranteed at the 1969-72 average, estimated by United Kingdom officials to be substantially higher than the average of recent years. During the transitional period, the enlarged EEC Council of Ministers might make adjustments between the guaranteed quantities of butter and of cheese, provided the tonnage expressed in milk equivalent corresponds to the total quantities agreed for the two commodities for the year in question.

After 1977 the guarantees for cheese would be eliminated. For butter, the Community would examine, starting in 1975, the nature of future arrangements, taking into account, on the one hand, the progress in the diversification of the New Zealand economy and, on the other, the action taken by trading countries to conclude an international agreement on dairy products.

Australia is mainly concerned about the continued access of its sugar and butter to the United Kingdom market. Under the Commonwealth Sugar Agreement, Australia has a United Kingdom import quota of 335 000 tons annually; this Agreement expires at the end of 1974 and continued access to the United Kingdom market for Australian sugar after that date will presumably be governed by such further international sugar arrangements as may be negotiated. Australia, as a "developed" country, is apparently not covered by the EEC-United Kingdom agreement

[9] See *The state of food and agriculture 1959*. p. 55-56.

[10] Concerning these arrangements, the New Zealand Prime Minister is reported to have commented: "I am confident that we can safeguard New Zealand's interests within the framework of the broad agreement reached between Britain and the Six. Moreover, we shall be on a unique footing in our future dealings with the enlarged Community. No other country will enjoy the same advantage." *The Times*. 25 June 1971.

that the interests of "developing" Commonwealth countries, whose economies are heavily dependent on sugar exports, are to be safeguarded after expiration of the Commonwealth Sugar Agreement.

Agricultural prices and incomes

During the 1970/71 season the gross value of farm production in Australia is estimated to have fallen, for the second consecutive season, by about 4 percent. Again, a smaller wheat harvest and lower prices for wool were the major causes. The value of cattle slaughtered continued the upward trend of recent seasons and that of dairy production showed little change. With production expenses continuing to increase, net farm income is estimated to have totalled about 10 percent less than in 1969/70.

In New Zealand, gross farm income during the 1969/70 season (July-June) is estimated at $NZ 924 million, about 5 percent above the year before. The increase resulted from higher returns for all types of meat animals. Returns from grain and other field crops, wool, and dairy products were all lower, mainly because of reduced production, although wool prices were also lower. Data on input expenses were not available at the time of writing, but they are known to have risen and the net economic result of the farm sector is likely to have been less satisfactory than data on gross income would suggest.

Problems, policies and programmes

A further increase in Australian wheat stocks during 1969/70 left the end-of-season carryover at a record level (Table II-19). As an incentive for growers to restrict their 1970 plantings, the delivery quota for wheat was reduced by about 9 percent (from 9.7 to 8.7 million tons). The area planted in 1970 was actually 32 percent below the 1969 level and the national average yield slightly higher than the year before. Thus, the 1970 harvest was lower by 29 percent and below the national delivery quota. It is anticipated that exports will continue to increase during the 1970/71 season and may in fact approach the record level of 1966/67. An important reduction of Australian wheat stocks during the 1970/71 marketing season therefore seems likely. For the 1971 crop the delivery quota has been increased to 9.2 million tons.

The wool industry, a major earner of foreign exchange for both Australia and New Zealand, remains in a serious cost/price squeeze. Export demand was weak and prices declined throughout 1970, although some revival was reflected in stronger prices at the beginning of 1971. Domestic inflationary pressures,

TABLE II-19. – AUSTRALIA: SUPPLY AND UTILIZATION OF WHEAT

	1968/69	1969/70	1970/71 [1]
	..... *Million metric tons*		
Beginning stocks (1 December)	1.4	7.3	7.2
Production	14.8	10.5	7.5
Domestic use	2.5	2.6	2.2
Exports [2]	6.4	8.0	7.1
Ending stocks (30 November)	7.3	7.2	5.4

[1] Preliminary estimates. – [2] Includes wheat equivalent of wheat flour.

however, continue to push costs upward. To help the industry, Australia has budgeted $A 30 million for a one-year scheme of emergency relief for wool growers pending the initiation of other action to help the wool industry adjust to the changing longer term situation. Some relief will result also from the reduction (in August 1970) from 2 to 1 percent of the levy on wool sales, collected to finance research and promotional activities. This will be compensated by the shift of an additional part of the costs of these activities from the wool growers to the Government.

The Australian Wool Commission was established in 1970 as a compromise between conflicting pressures for a continuation of the free auction system and demands for the establishment of a single wool-marketing agency with monopoly powers to buy and sell the wool clip. The functions and powers of the Commission, which began operations on 16 November 1970, include the operation of a flexible reserve price system on a day-to-day basis for wool sold at auction, a price averaging plan for wool in small lots, and a voluntary pool for wool in lots exceeding 3 bales. It may buy and sell wool outside the auction system. No quantitative or financial limits have been placed on the amount of wool that the Commission may buy and hold. The cost of its operation, including any losses that may be incurred on wool acquired, is to be borne by the Government. If the necessary concurring legislation is enacted by the states, the Commission will be authorized to control, when necessary, the private buying and selling of wool outside the auction system and to set the terms and conditions governing the sale of wool at auction. At the end of the 1970/71 season, the stocks held by the Commission were reported to total 459 000 bales. For the 1971/72 season, a wool subsidy scheme has been announced, to guarantee an average price of 35 cents a pound.

Stocks held by the New Zealand Wool Commission were reduced by approximately 130 000 bales during the 1969/70 season to about 350 000 bales on 30 June 1970. For 1970/71, the minimum price

level supported by the Commission's operations was lowered to 21 cents per pound, 6.5 percent below that of the previous season. Private sales outside the auction system are reported to have increased during recent seasons and to have amounted to approximately 17 percent of total sales during 1969/70. By the middle of the 1970/71 season the stockpile was reduced by one quarter and further reductions were anticipated before the end of June 1971.

In Australia, government payments in support of the dairy industry for the 1970/71 season remained approximately unchanged, and were accompanied by an upper limit on the volume of dairy production for which such support is available. An annual government bounty of $A 27 million enabled dairy factories to pay producers the equivalent of 34 cents per pound, commercial butter basis, during the preceding three seasons. For 1970/71 the bounty was increased to $A 49.25 million, sufficient to enable factory payments to producers to continue at this average rate only if production is limited to 220 000 tons of butter and 70 000 tons of cheese. The increase in the bounty, moreover, was roughly offset by the abolition of devaluation compensations which had been paid during the previous two seasons. The Government has no authority to impose limits on production and relies on industry organizations to keep output at the desired volume.

The Australian Government has offered to provide $A 100 million to the states over a four-year period for debt reconstruction, property adjustment, and rehabilitation of farmers. Broad agreement is reported to have been reached concerning the programme and details are being negotiated with the state governments. Negotiations are also continuing between the federal and state governments concerning the programme for rationalization of the dairy industry, in an effort to improve its efficiency and ability to compete internationally. Some years ago a federal government offer of $A 25 million over a four-year period was made for this purpose.

In New Zealand, efforts continued to ease the cost/price squeeze on producers and to adjust production to take advantage of changing export demands. A fertilizer subsidy programme became effective in July 1970 with payments of $NZ 5 per ton on all fertilizers used. It is estimated that the cost to the Government will be about $NZ 13.5 million annually. The 1970 budget also provided a special agricultural assistance fund for farmers who have encountered serious financial difficulties for reasons beyond their control (such as drought). All land used for farming or agricultural activities, excluding forest land, became exempt from the land tax as of 31 March 1970. The scheme, initiated in 1969 for diverting part of the productive capacity of dairy farms to beef production, is being continued through the 1970/71 dairy season.

The salient feature of forestry development in 1970 in both Australia and New Zealand was the continued emphasis on afforestation; in the two countries combined the area afforested increased by another 20 percent. In Australia, some 30 000 hectares are now planted every year, and plans were made in 1970 to raise this figure in order to increase self-sufficiency in forest products. To this effect the recently passed Softwood Forestry Agreement will provide loans to the states for financing the establishment of coniferous plantations. In New Zealand the annual planting rate increased from about 15 000 to 18 000 hectares. The expanded plantation programme is to be carried out mainly by the State but a subsidized loan scheme has also been developed to encourage farmers and local authorities to plant woodlots, especially on otherwise unproductive land. The output from man-made forests already provides 80 percent of the timber used in New Zealand and is contributing to a rapidly growing export trade.

Industrial processing of timber plays an increasingly important role in the overall economic and social development of the region. In New Zealand, where a number of new industrial installations have grown up close to the main concentration of exotic forests in the North Island, the forest industries sector generates one eighth of industrial income, provides over two fifths of all manufactured exports, employs one tenth of the industrial labour force and contributes one twentieth of the GNP.

Latin America

According to preliminary estimates by the Economic Commission for Latin America, the combined gross domestic product of the Latin American countries increased in 1970 by 6.9 percent at constant prices — slightly more than in each of the previous two years. Rates of growth above the regional average were achieved by Ecuador (9.5 percent), Brazil (9.0 percent), Panama (8.6 percent), and Mexico (7.4 percent). Sectors of the combined economies with high average increases in output were manufacturing and construction (both 8.0 percent) and services (9.3 percent). For the region as a whole GDP in agriculture is estimated to have risen by 4.9 percent, a very satisfactory increase in comparison with

the past, although the situation varied widely among countries. Mining output in the region increased by 4.6 percent.

With population growth estimated at 2.9 percent, the increase in GDP per head over the last three years averages almost 4 percent. This recent rate compares very favourably with the longer term average of 2.5 percent a year between 1960 and 1969. However, there is widespread conviction that social tensions in the region — particularly those associated with structural unemployment — can be overcome only if this high rate can be maintained, or preferably lifted to 8 percent a year, to ensure a steady growth rate of per caput output of 4 or 5 percent a year through the 1970s. [11]

The degree of underutilization of the economically active population in the region, including both unemployment and underemployment, is estimated at a full unemployment equivalent of 28 percent of the labour force. [12] Much of this unemployment is in agriculture, on which about 145 million inhabitants of the region (60 percent of the total population) depend for a living. Land resources in many areas, particularly zones of small cultivators, are so scanty in relation to population and so deteriorated from overuse that even the most effective programme of rural development cannot be expected to improve significantly rural living standards until many people are shifted out of agriculture. Land tenure reform and opening up new land, therefore, cannot provide a complete solution to rural unemployment. At the same time, already widespread urban poverty and unemployment mean that little or no relief of rural unemployment can be expected from the movement of population to the cities.

There is a powerful incentive in the region, therefore, to think afresh about development strategies and policies. The main general problems are seen to be, first, the inability to achieve a balanced economic growth of rural and urban areas, in which increases in manufacturing activity are matched by improved agricultural output and productivity; second, the inability to provide productive employment for the whole annual increase in the labour force and the already existing unemployed; and third, the extreme inequality of income distribution, coupled with conspicuous consumption at the expense of saving in the small high-income group, which limits investment capacity and restricts growth of demand by the greater part of the population.

To what extent, and at what cost to GNP growth, employment could be made the primary objective of development planning (as has been suggested in a recent study on Colombia),[13] remains an open question, answers to which will depend on the characteristics and resource endowment of each economy. In the meantime, while the need for policy changes is recognized, pressures to bring them about are not as strong as they might be as the large rural populations, often culturally separate, have little or no voice in national or local decision-making.

Although prices of Latin America's export products rose in 1970 for the third successive year, there was no corresponding improvement in the balance of payments. Initial estimates put the total value of exports at $13 700 million — 9.5 percent more than in 1969 — but with both a larger volume and higher unit values the f.o.b. value of the region's imports rose by 12.5 percent to $12 700 million, and the trade surplus was reduced by about 20 percent.

Inflation continued in the region during 1970 with variations in incidence between countries. The largest increases in consumer prices in 1970 were in Argentina (where the slowdown of 1969 was reversed), Brazil, Chile and Uruguay. The price rise accelerated in Jamaica from 6.3 percent in 1969 to 9.9 percent in 1970, in Mexico from 1.1 to 5.1 percent and in Costa Rica from 2.2 to 4.6 percent. In Colombia the rate of price increase was reduced slightly to 9.1 percent, but only in Haiti and Paraguay did prices fall absolutely, by about 2 and 3.5 percent respectively.

Agricultural production

Within a 3 percent overall increase in agricultural output in 1970, the region's food production expanded by 5 percent. However, this was due largely to the remarkable increase in Cuba's sugar production — by 80 percent to a record 8.5 million tons — the bulk of which is exported outside the region. For the region excluding Cuba, the increase in food production comes to 3 percent, approximately the same as the population growth, and total production to 1 percent.[14]

In South America most countries showed increases, in some cases at rates above average, as in Chile, Ecuador, Peru and Venezuela, but the total for the subregion was held back by Argentina, where there was a small decline, and Brazil, where the increase was only slight. The index for the Caribbean reflects mainly the steep increase in Cuba. Output in Central America, where the weather was generally good, was also up (Table II-20).

[11] Raúl Prebisch. *Change and development: Latin America's great task*. Washington, D.C., 1970.

[12] *See* Latin American Institute for Economic and Social Planning. *Elementos para la elaboración de una política de desarrollo con integración para América Latina, síntesis y conclusiones*. Mexico, 1969. (Document INST/S.4/L.2)

[13] International Labour Office. *Towards full employment: a programme for Colombia*, prepared by an interagency team organized by the International Labour Office. Geneva, 1970.

[14] However, preliminary data frequently underestimate the output.

TABLE II-20. – LATIN AMERICA: INDICES OF AGRICULTURAL PRODUCTION

	1966	1967	1968	1969	1970 (preliminary)	Change 1969 to 1970	Per caput agricultural production in 1970
	1952-56 average = 100					*Percent*	*1952-56 average = 100*
PRODUCTION IN SELECTED COUNTRIES (all products)							
CENTRAL AMERICA	182	188	194	196	201	+ 3	119
Costa Rica	166	183	193	213	231	+ 8	127
El Salvador	162	172	171	190	190	—	119
Guatemala	187	203	201	196	196	—	123
Honduras	162	170	192	177	178	—	106
Nicaragua	213	214	214	195	209	+ 7	129
Mexico	181	186	190	191	195	+ 2	114
Panama	162	169	197	205	202	— 1	123
CARIBBEAN	106	120	111	108	137	+ 27	97
Barbados	106	121	100	90	98	+ 8	85
Cuba	97	122	111	104	154	+ 48	110
Dominican Republic	125	130	125	138	149	+ 8	85
Haiti	105	102	103	103	106	+ 3	78
Jamaica	145	134	129	121	118	— 2	87
SOUTH AMERICA	140	147	146	154	158	+ 3	102
Argentina	121	128	120	130	129	— 1	98
Bolivia	190	198	198	200	203	+ 1	136
Brazil	154	163	165	176	179	+ 2	112
Chile	134	132	137	129	134	+ 4	91
Colombia	137	143	151	154	156	+ 2	95
Ecuador	209	216	214	220	231	+ 5	138
Guyana	143	149	147	154	144	— 7	89
Paraguay	133	140	141	146	148	+ 2	95
Peru	146	147	142	150	156	+ 4	99
Uruguay	96	87	100	104	106	+ 2	86
Venezuela	191	207	214	223	232	+ 4	129
REGIONAL PRODUCTION							
Total							
All products	140	148	147	153	158	+ 3	
Food only	142	151	152	157	166	+ 5	
Per caput							
All products	100	103	99	100	101	—	
Food only	102	105	102	103	105	+ 2	

Among the main commodities, wheat output in 1970 fell about 18 percent, from 12.8 to 10.5 million tons. Drought in Argentina reduced the size of the crop by 40 percent, but output elsewhere increased. Strong demand on world markets, together with good weather and the increased use of hybrid seeds, led to an 18 percent increase in maize output from 33 to 39 million tons. There was also a 15 percent rise in rice production to 11.6 million tons. Poor weather in parts of Central America caused banana production to rise only slightly from 16.6 to 17.3 million tons. Declining profitability and unfavourable growing conditions resulted in a drop in cotton production from 1.7 to 1.6 million tons. The region's output of beef and veal rose by only 2 percent, compared with the average annual increment of 4.4 percent in the previous five years, a serious lag for such a high-value product. Output of pork, mutton and lamb, and poultry meat also increased very little, and milk production, which in preceding years had risen rapidly, declined fractionally in 1970. Wool production remained unchanged. The increase in sugar output, by almost 5 million tons to 23.6 million, was mainly accounted for by Cuba. Coffee production in the region was down by almost 15 percent, mainly because of heavy losses in Brazil.

The severe reduction in Argentina's wheat output, from 7.0 to 4.2 million tons, largely explains the stable overall level of production in that country. Early-season drought, together with competition from sorghum, maize and cattle, caused the area sown to decrease to 3.3 million hectares, and has led the Government to raise support prices in an attempt to reverse this fall. Market prospects for maize were good and the crop increased by 36 percent, mainly because of higher yields; sorghum output also rose, from 2.6 to 4.1 million tons. Rice production also continued to increase. Beef and veal output remained virtually unchanged at 2.9 million tons, as did wool production, and the failure to expand herds represents a brake on future increases.

Wheat production in Brazil, encouraged by price and credit policies, rose by 21 percent to 1.7 million tons in 1970, and maize output by about 21 percent to 15.4 million tons. Higher yields also resulted in an increase of 17 percent in Brazil's rice crop, the largest in the region and, since markets were poor, stocks accumulated in spite of subsidized exports. Sugar production rose 19 percent to 5.4 million tons. However, frost in mid-1969 and the appearance of rust fungus reduced coffee output by more than 30 percent, and Brazil's share in a smaller regional output fell from about 50 to less than 40 percent. Both cocoa and banana crops were larger, by 7 percent. Cost pressures brought about a reduction in the area under cotton and output was reduced by 7 percent. As in Argentina, beef production increased very little.

In Mexico, the output of most important crops increased, with the exception of sugar, which fell by 8 percent, rice, which was only slightly lower, and cotton. Cotton output, influenced by falling world prices and the high risk of budworm damage, fell from 510 000 to 360 000 tons. The corresponding fall in cottonseed output resulted in a considerable underutilization of vegetable oil processing capacity. Maize and sorghum output rose by about 6 percent and wheat by some 2 percent.

The increase in production in Peru reflected bigger harvests of maize and rice, and a recovery in sugar output to 795 000 tons, thanks to improved irrigation. In Chile, wheat area and output increased, encouraged by a forward price formula, whereby the harvest price was announced a month before sow-

ing, and the maize crop was also bigger. Colombia's coffee crop, the second largest in the world, was 7 percent higher, while production of cotton was lower. Ecuador's cocoa production remained unchanged and still well below (28 percent) the 1968 peak level. Banana production increased by 7 percent. Uruguay recouped the 1968 loss in wheat but its wool production fell owing to lower world demand. The maize crop in Paraguay was bigger, but as regards beef production the country is in much the same situation as Argentina and Brazil.

The first, admittedly early, indications for agricultural production in 1971 show no acceleration in the growth of output, estimated at 1 to 2 percent for the region as a whole. However, as in 1970, the overall indicators are again heavily influenced by the large changes in Cuba's sugar crop, which is estimated to have fallen back by nearly a third to the more normal level of 5.9 million tons. If Cuba is excluded, the increase in total agricultural production may be tentatively estimated at 2-3 percent, and somewhat less for food products only. The increase would thus, again, be below the rate of population growth in the region.

Among the various subregions, the situation appears to have been better than in 1970 in Central America, where all countries except possibly Mexico were promising to show increases ranging between 3 and 8 percent. In the Caribbean, in contrast, output fell not only in Cuba but also in some other countries, although showing increases in the Dominican Republic and Jamaica. In South America, the available information suggests widespread but moderate increases, except in Colombia and Ecuador where the overall output appears to have remained unchanged. In the last mentioned subregion as a whole, the total production may have risen at about the same rate as in 1970.

Among the major commodities, wheat production may be up by over a tenth, with a recovery in Argentina in response to price incentives and better weather, and a further large increase in the rapidly expanding output of Brazil. Coarse-grain production is also expected to be larger, with an expansion of area under maize in Argentina and larger crops also expected in Brazil and Mexico. The only major setback in this commodity group is the large reduction in the harvest of millets and sorghum in Mexico because of drought. The region's paddy output is expected to be down, with smaller crops in Argentina, Brazil and Peru, and little change in Colombia. The reduction in sugar production, estimated at nearly a tenth, reflects mainly the cutback in Cuba; most other major producers showed considerable increases, ranging generally between 5 and 7 percent. Little overall change was estimated in banana production, but a large increase (by about a quarter) was expected for coffee, mainly because of a steep recovery in Brazil.

Beef and veal production is expected to be slightly less than in 1970 because of smaller output in Argentina. However, this country's export supplies are not expected to be affected, because temporary measures have been taken to reduce consumption. Most major producers are expected to show some increase in milk production. Wool output is estimated to have remained stationary for the fourth successive year.

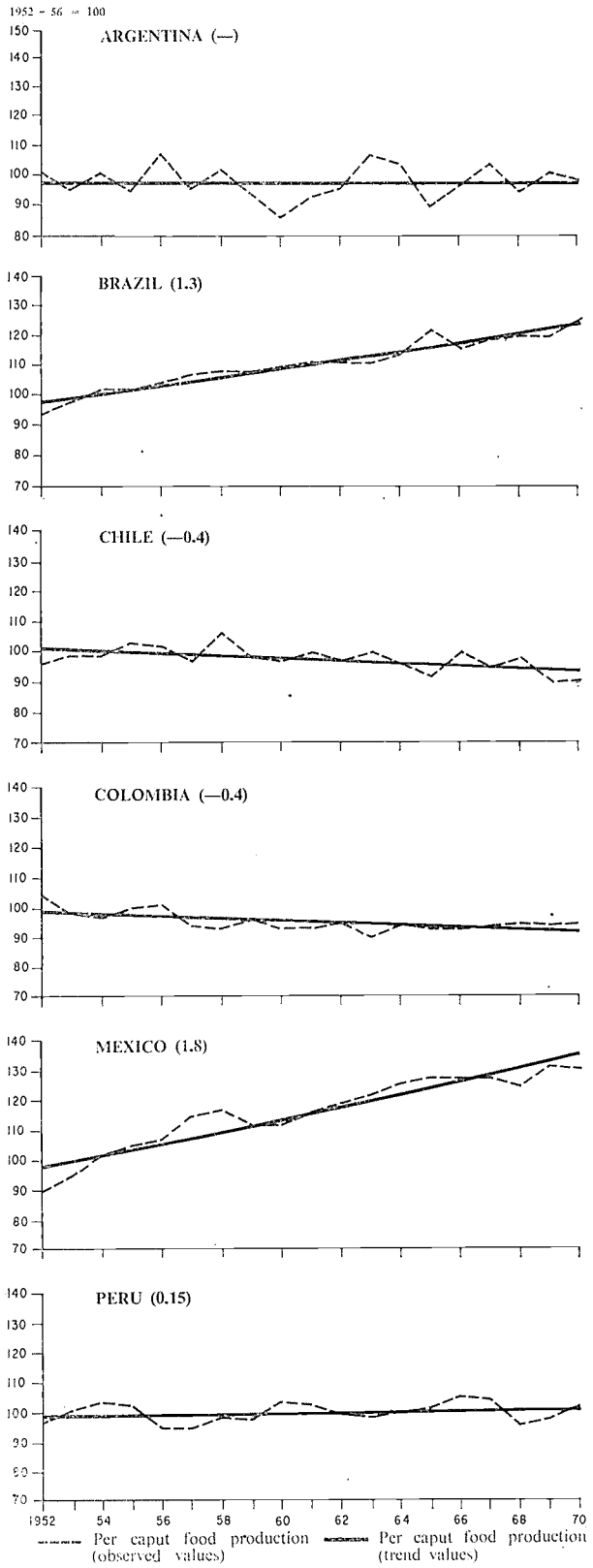
Trends in food production

While most countries in Central America have succeeded in raising their per caput food production levels over the past decade or so, in the Caribbean and in South America this has not been the case. Among the six largest countries of the region only two, Brazil and Mexico, have succeeded in consistently raising their food production per caput, at longer term rates of 1.3 and 1.8 percent a year, respectively. In the other four, output per head has remained unchanged or has fallen (see Figure II-2).

The steady expansion of food production in Brazil, at an annual rate of about 4.5 percent, has been accomplished mainly by extending the cultivated area at a rate of about 1 million hectares a year, and to a lesser extent by raising yields through the adoption of new methods and better farming practices. Stimulated by strong domestic demand and relatively high government producer support prices in recent years, cereal production has increased at an average rate of some 5.6 percent a year, particularly that of rice and maize. Brazil is an occasional net exporter of rice, and wheat imports, although still the most costly single item on the import list, are decreasing. The rate of cereal self-sufficiency is expected to increase further by 1974. The expansion of the livestock sector has been held back to only 3 percent per year for the decade by the slow growth of beef production (2.4 percent a year in the 1960s), which may have been partly due to a government policy to keep the consumer price low. Early in 1970 such interventions were largely eliminated and price incentives were adopted. Price policies on wheat, rice, maize and potatoes have contributed to the reversal of the fall in domestic food production, which rose by about 8 percent in 1970. Direct public investment in agriculture has been small, but the sector has benefited indirectly from government efforts in other sectors, particularly transport.

The very good record in Mexico, the region's third largest agricultural producer (after Brazil and Argentina), has been built on the conscious efforts at agricultural development initiated in the 1930s. The sector has also benefited from demand associated with

FIGURE II-2. – LATIN AMERICA: TREND OF PER CAPUT FOOD PRODUCTION IN SELECTED COUNTRIES, 1952-70



NOTE: The figures in parentheses indicate the annual compound percent rate of growth of per caput food production on the trend line shown.

a rapid rate of general economic development, which has reduced agriculture's share in GDP from 23 percent in 1950 to 12 percent in 1970. Its share in the economically active population, however, remains high, at close to 50 percent, and relative productivity of labour in agriculture has declined from 39 percent of the national average in 1950 to 17 percent in 1969.

Agrarian reform initiated during the 1920s has been an important growth determinant, with its effects on the rural social structure and its encouragement of productivity by fuller utilization of land and labour. Commercial farming has, however, been the main beneficiary of research developments in wheat, maize and sorghum production, but efforts to transfer modern methods to small-scale farmers have been stepped up recently, and the number of extension workers has increased from less than 400 in 1964 to 1 100 in 1970. Since 1956 fertilizer utilization has been tripled, but soil fertility studies reveal a large potential for increased use. The commercial, large-scale agricultural sector has been assisted by an increasing volume of credit, which expanded by 12 percent a year between 1960 and 1969. About 90 percent of public investment in agriculture (10 percent of total public investment) has until recently gone into extending irrigation and even now 75 percent is destined for this purpose.

The contribution of yield to the increase in total output is estimated to have risen from about 50 percent in 1941-50 to 73 percent in 1951-60 and 80 percent in 1959-65. Wheat output per hectare increased between 1950 and 1965 at a rate of 6.7 percent a year, compared with 3 and 2.5 percent for maize and rice. The growth of crop production in 1970 was held back by unfavourable weather, but for the period 1960 to 1969 amounted to 5 percent per year. Livestock production grew at about the same rate during these years, and accelerated further to 7 percent between 1967 and 1969.

The main structural defect in the farm sector is the sharp difference between a small number of large-scale commercial farmers, who use about 90 percent of the modern inputs and produce much of the marketed output, and the large number of small-scale farmers as yet scarcely touched by modernization. In an effort to reduce the resulting marked inequity of agricultural income distribution, the Government is now placing more emphasis on the commercial development of small farms.

While agriculture in Argentina contributes only 14 percent of the value of total GDP and employs only 18 percent of the economically active population, the country is a major provider to world markets of cereals, meat, and livestock products, which provide about 90 percent of the country's foreign exchange earnings. Nevertheless, during the last two

decades, agricultural production has not achieved its potential and has barely kept pace with the relatively low rate of population growth (2 percent per year).

The trends in overall agricultural production in Argentina reflect mainly those of the fertile pampa region, which produces four fifths of total output and most of the farm exports. For the country as a whole, the production of maize and sorghum has been rising steadily for more than a decade, but this has been in contrast to and partly at the expense of other cereals, particularly wheat. Yields have not been increasing, and a substantial rise would require the more widespread and intensive use of fertilizers, at present limited by relatively high prices. Consumption of nitrogenous fertilizers in 1969/70 (outside the pampa region where high soil fertility makes them less essential), on crops such as fruit and vegetables, amounted to only 35 000 tons. Beef output in the early 1960s was no more than it had been a decade before, and only in recent years have efforts been made again to increase the cattle population and improve pastures.

It may be questioned whether a more rapid increase in output would have been possible, given the already high level of domestic food consumption and generally adverse trends in demand in international markets, except for beef and feedgrains. The general policy approach has been to consider agriculture a largely self-reliant sector which cannot expect much government assistance. Between 1965 and 1968 only about 1.5 percent of government investment went to agriculture, and although it has recently increased the share remains small at 3 percent. The availability of credit has also increased although, because of inflation, it is mainly on short term, and institutional support and research remain small.

Also in Peru agricultural output per caput has remained virtually unchanged for the last two decades, except for short-term fluctuations. This has meant not only that the sector's contribution to the country's GDP has fallen in the 1960s from 25 to 15 percent, but also that it has failed to meet the rising demand stimulated by rapid overall economic growth, based largely on exploitation of mineral and fisheries resources. Food imports have therefore risen rapidly, from $58 million in 1960 to $150 million in 1969.

Since 1950 most of the increase in food production, at an average rate of 3 percent a year, has come from a two-thirds extension of the cultivated area. There has been little increase in production of wheat and barley, but the output of maize, and particularly rice, has risen substantially. Conditions in the coastal plains are favourable to rice, which yields about 4 tons per hectare. Growth of rice output has been achieved by doubling the irrigated area between 1950 and 1970, while yields have remained more or less unchanged. Livestock production has increased little, except for poultry. Since the rapidly growing fish production has been mainly for conversion into meal and oil for export, that sector has not made a compensating contribution to the protein supply. Sugar production, about half of which is exported, rose steeply during the 1950s but has not increased during the last decade, as both yields and area harvested have remained unchanged.

Constraints to more rapid growth of agricultural production include the distance of main agricultural areas from important centres of consumption, inadequate transport and storage facilities, limited attention to research, and deficiencies in land tenure forms which, however, are now being given major attention.

Chile is not a predominantly agricultural country, and the one fifth of the population in the sector generates only one tenth of GDP and 3 percent of exports. Of the increase in output at a rate of only 2.2 percent a year for the past 20 years, about a third is attributable to increased area. Domestic demand grew by about 3 percent a year between 1950 and 1968 and the deficit had to be met by imports, which today account for between a quarter and a fifth of total food supplies and a fifth of total imports. Structural and institutional inadequacies, particularly the concentration of land and water resources in the hands of a few, inhibit full utilization of the land, the absorption of excess labour and the adoption of modern production methods. Land reform, which is under way, will need the support of facilities to provide modern inputs and instruction in their use. Fertilizer use, although increasing, is low, and the adoption of certified seeds is limited. Capital growth in agriculture was at the rate of only 3.5 percent a year between 1956 and 1965, but there has been a recent increase.

In contrast to Chile, agriculture plays an important part in the economy of Colombia: it accounts for 80 percent of the country's export earnings (mainly coffee, cotton and tobacco), provides employment for about 45 percent of the labour force, and produces nearly 30 percent of the GDP. However, food production per caput declined slowly through the 1950s, and although there has been some improvement in the 1960s output has only barely kept pace with the very rapid (3.2 percent) rate of population growth.

The growth of crop production, at a rate of about 3 percent a year during the past two decades, was more rapid than that of livestock, and most of the increase was due to an expansion of area. The largest increases have been in rice (from 450 000 to 675 000 tons during the period 1960 to 1970), where

fertilizer use increased toward the end of the decade, and sugar, where an expansion of area raised output at a rate of 8 percent a year during the same period. The production of potatoes, an important food crop, also rose steeply. Wheat output, on the other hand, fell from over 140 000 to 80 000 tons because of insufficient price incentives and competition from other crops, particularly barley, for the relatively limited amount of suitable land. Maize yields and production have remained unchanged, despite promising research results on hybrid seeds, while a larger output of soybeans, cottonseed, sesame seed and palm oil has permitted a reduction in imports of edible oils and fats, especially since the mid-1960s.

Both meat and milk production have expanded at a rate of about 3 percent a year, slightly slower than population growth, and no major advance is reported on animal protein intake, which according to nutrition surveys remains below the recommended standard. The technological level of livestock production remains low, but the Government is making efforts to improve it by increasing investment through externally financed credit programmes.

Fishery production

Fishery production in Latin America is estimated to have risen by 30 percent in 1970, more than making up the decline of the previous year, and exceeding the previous record of 1968 by some 7 percent. Landings were up in most countries of the region, including Brazil, Chile, Mexico and Peru, as well as in some countries with smaller fisheries. The catch of the Peruvian reduction fisheries alone is estimated to have increased by some 25 percent to close to 12 million tons.

Peru is making serious efforts to encourage domestic consumption, which now absorbs only about 200 000 tons, with a view to tripling it in a few years. Chile's fish reduction industry also benefited from the good anchovy catch and was able to produce almost 10 percent more meal, as well as an increased quantity of oil. Brazil's fisheries, helped by the comprehensive investment promotion legislation enacted in 1967, have expanded considerably and production in 1970 is estimated to have been 5 to 10 percent above the 1969 level. In Mexico, where fisheries had experienced serious difficulties in recent years, a rise in production was reported.

Emphasis on production for domestic consumption is increasing not only in Peru but also in most other Latin American countries with serious problems of malnutrition in inland areas. Investment in fishing operations for supplying domestic markets and campaigns to encourage fish consumption are being supported by expanding the distribution infrastructure, and by projects concerned with the survey and development of inland water fishery resources. In some countries progress is already evident. In Mexico, it is estimated that per caput consumption outside the Federal District (which has an already relatively high per caput consumption) has gone up in the last five years by over 25 percent, and in some other countries, for example Cuba, at an even faster rate.

Forest production

Roundwood removals from Latin American forests continued to rise at a slow pace in 1970. Removals of industrial roundwood increased somewhat faster than those of fuelwood, but still equal only one fifth of the fuelwood removals.

There is a distinct trend toward an increasing share of coniferous wood in industrial roundwood removals. Removals of coniferous sawlogs are now about as large as those of broadleaved sawlogs, although large areas of tropical broadleaved forests remain untouched. This has meant, however, that the few coniferous resources, particularly in Brazil and Chile, are under increasing pressure until new supplies from coniferous wood plantations become available. Brazil, which has the largest forest resources in the region, continued to intensify its forest operations; but because of the unusually heavy rainy season there was a marked slowdown of wood supplies to industry, particularly in the southeast of the country.

Pulp and paper production continued to expand relatively fast in 1970, and the range of grades and qualities of paper and paperboard is becoming increasingly diversified. A sizable share of paper and paperboard is still manufactured from imported pulp, however, and while current preinvestment activities point to a notable increase of pulp capacity in the near future, there are no indications of a rise in production of newsprint in the region.

Noteworthy advances have also been made in the production of wood-based panels, particularly of particle board. In the last three years, five new factories have been established and regional production more than doubled to about 500 000 cubic metres in 1970. In the same year plywood production exceeded 600 000 cubic metres, but recent trends indicate that plywood is losing ground to particle board. Production of sawnwood, still the largest item, increased in 1970 after a period of apparent stagnation. However, most of the sawmills are small, often badly equipped, and frequently work below capacity.

Trade in agricultural, fishery and forest products

Preliminary estimates of Latin American trade in 1970 indicate a sharp rise in earnings from agricultural and fishery products and a smaller increase in those of forest products. Substantially higher earnings from coarse grains, sugar, bananas and coffee more than offset declines for wheat, cocoa, cotton and wool. Unit values received for many of the region's principal exports, notably coffee, sugar, bananas and maize were mainly responsible for the increase. Cotton prices were also higher, but the volume of shipments was smaller and the value therefore fell considerably (Table II-21).

The 15 percent rise in the value of cereals exports reflects increased shipments of coarse grains from larger crops in Argentina and Brazil at the higher prices which prevailed during the year. On the other hand, earnings from wheat were lower as a shortage of supplies kept Argentina's exports at low level, and prices were also slightly down. Reports indicated, in fact, that the country may have had to purchase wheat to fulfill its exports commitments during the 1970/71 season.

Earnings from sugar rose by almost one third. World market prices reached their highest level since 1964, and the volume was substantially larger, principally because a record crop enabled Cuba to increase its shipments by over one half. Cuban exports to the U.S.S.R., in fact, are estimated to have exceeded 3 million tons, the largest amount since 1961. Exports from Brazil, the Dominican Republic and Peru were also larger, although Peru together with Mexico, whose exports were smaller, were unable to fill their International Sugar Agreement quotas.

The region's banana exports are estimated to have reached record levels both in value and volume despite adverse weather conditions during parts of the year in Central America and the Caribbean. Larger exports from Costa Rica and record shipments from Ecuador, offset reductions from Colombia, Honduras, Nicaragua and the Caribbean countries.

Substantially higher coffee prices raised the value of regional exports of this commodity by some 13 percent despite smaller shipments from Brazil, the main exporter, and Mexico. The volume of exports from the rest of Latin America remained on the whole at a high level, slightly above 1969, and almost all exporting countries, including Brazil and Mexico, benefited from large increases in their earnings from coffee.

The sharp drop in world market prices for cocoa and wool was responsible for the reduction in earnings from these commodities. There was a rapid decline in cocoa prices until mid-1970, and uncertainty regarding Brazilian and African crops and speculation kept prices fluctuating for the remainder of the year. The overall effect was a drop of some 25 percent in the average unit value received for Latin American exports. Thus, even though the volume of shipments was slightly higher, earnings were reduced by some 17 percent. Prices of wool declined through most of 1970 because of reduced utilization, but shipments from Uruguay may have been up somewhat as a result of larger purchases by the United States.

In contrast, reduced earnings from wheat and cotton reflected smaller shipments rather than lower prices. Argentina's wheat production was sharply reduced and exportable supplies of cotton in Brazil, Mexico and Peru were smaller.

For meat, trends were mixed, but increased earnings from beef and veal boosted by higher prices were sufficient to offset the reduction in volume of shipments of canned meat, and the value of all meat exports combined was larger. Adverse weather in Argentina in the second half of 1970, together with strong domestic demand which caused the rise in domestic prices to narrow exporters' profit margins, made it impossible for the country to maintain its exports of beef and veal and canned meat. Measures were introduced to counteract this trend by limiting domestic sales of beef, establishing maximum prices for them, and granting tax rebates for heavier cattle destined for export slaughter. Tax incentives were also introduced to encourage food processing for

TABLE II-21. – LATIN AMERICA: INDICES OF VALUE OF EXPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	Share of total agricultural exports in 1970	1966	1967	1968	1969	1970[1]	Change 1969 to 1970
	Percent	*1957-59 average = 100*					*Percent*
AGRICULTURAL PRODUCTS	90	123	117	127	128	143	+ 12
Food and feedstuffs	50	144	145	142	148	178	+ 20
Cereals	(9)	231	188	169	183	211	+ 15
Sugar	(20)	109	125	121	124	162	+ 31
Bananas	(6)	120	132	138	141	155	+ 10
Meat	(8)	152	143	157	170	188	+ 11
Beverages and tobacco	30	98	90	100	105	116	+ 10
Coffee	(26)	100	91	100	102	116	+ 13
Cocoa	(2)	69	82	85	125	103	— 17
Raw materials	10	128	105	118	131	109	— 17
Cotton	(6)	140	108	130	150	116	— 23
Wool	(2)	117	97	106	92	84	— 9
FISHERY PRODUCTS	7	386	379	427	426	563	+ 32
FOREST PRODUCTS	3	137	127	157	179	185	+ 3
Agricultural, fishery and forest products	100	128	122	128	135	152	+ 12

[1] Preliminary estimates.

export, and modern processing equipment may now be imported duty free. The situation in Uruguay was completely different, with exports of beef and veal increasing partly at the expense of domestic consumption.

The limited information so far available on the region's agricultural imports in 1970 suggests that overall cereal imports totalled some 7.5 million tons, slightly more than the peak reached in 1968. Imports of wheat were smaller, with purchases by Brazil, the region's largest importer, and Peru substantially less. Imports of maize almost doubled, however, as Mexican purchases rose from 8 000 tons in 1969 to 760 000 tons in 1970, reflecting the effects of drought on the 1969 crop.

Preliminary estimates indicate that the value of fisheries exports from the region increased by over 30 percent in 1970, as a result of both a larger volume of shipments and a higher average level of prices. Higher fish meal prices throughout the year resulted in a further reduction in exports from Peru to the United States and, to a lesser extent, the Federal Republic of Germany and some other western European countries, as feed processors shifted to increased use of soybean meal in compound feeds. However, shipments to other destinations, particularly the centrally planned countries of eastern Europe, increased substantially, raising the value of Peruvian meal exports by some 40 percent. Trade in the future is likely to be affected by the establishment in mid-1970 of a public body to handle all export marketing of Peruvian fish meal and oil. Prospects for 1971 were for a somewhat smaller volume of trade, despite evidence of some recovery in imports by the United States following a decline in prices in the early part of the year.

In Chile, too, fish meal production was above the 1969 level, but shipments to new markets did not compensate fully for reduced exports to the United States and western Europe, and total exports were considerably smaller in volume than in 1969. Information for early 1971 indicates that expansion of sales to centrally planned countries has prevented the accumulation of stocks.

Among countries exporting primarily fishery products for human consumption, Brazil continued to expand its shipments to foreign markets in line with the trend of recent years. The value of the country's exports, which consist mainly of lobster and shrimp, has quadrupled in the last three years, and substitution of its large traditional imports of dried cod has also made some progress. Mexico's exports are reported to have shown an upturn after several years of decline, as shrimp exports to the United States rose by some 25 percent. Other regional suppliers of the United States shrimp market which succeeded in increasing their exports in 1970 were Colombia, El Salvador, Guyana, Panama and Venezuela, while those of Ecuador and Nicaragua were below the 1969 level.

Early estimates of trade in forest products indicate a considerably smaller increase in 1970 than in the preceding two years. The volume of exports increased only slightly, and there are indications that shipments of sawn hardwood, plywood and chemical pulp continued to grow at the steady, slow pace of the preceding years. Brazil reported increasing exports of Paraná pine plywood to neighbouring countries and the United Kingdom, but sawnwood exports, particularly mahogany, generally slackened. On the other hand Ecuador increased its sawnwood exports to the United Kingdom by 15 percent, and Guyana almost doubled its log exports to western Europe. Intraregional trade has been and is continuing to be a salient feature of Latin American forest products exports, and more than 50 percent of log and sawnwood exports and almost 100 percent of pulp and paper exports remain within the region.

Development plans and policies

In 1970 and early 1971 development plans were started in Argentina, Colombia, Guatemala, Jamaica, Nicaragua, Paraguay, Peru and Venezuela. The recent plan of Chile is being revised. Table II-22 presents the main features of all current plans in the region.

Governments now appear to be putting particular emphasis on a more equitable distribution of income, a correction of disparities in regional and sectoral development, and an accelerated creation of employment opportunities. Land reform has been assigned a major role in achieving these objectives, particularly in Bolivia, Chile and Peru.

Colombia's new plan of economic and social development for 1970-73 centres around the employment problem, and the agricultural sector is to play the biggest role in overcoming it. Major efforts will be made to stimulate production of food for the domestic market, somewhat neglected in the past. Labour-intensive techniques will be promoted for the production of agricultural raw materials, and of nontraditional export commodities including beef, citrus fruit and vegetables. The continuation of agrarian reform is considered necessary to achieve a more equal distribution of factors of production and agricultural income.

The agricultural sector is also expected to make a major contribution to Guatemala's economic growth — both directly, through accelerated production, and indirectly, because of growing demand for manufactured goods — according to the national development plan for 1971-75. To maximize employment opportunities in agriculture, mechaniza-

TABLE II-22. – LATIN AMERICA: MAIN FEATURES OF CURRENT DEVELOPMENT PLANS

	Currency	Duration of plan	Scope [1]	Investment		Foreign exchange component of total investment	Share of agriculture		Planned growth rate of:						
									GNP	Agricultural production		Export earnings		Employment	
				Total	Public		Total investment	Public investment		Total	Cereals	Total	Agricultural	Total	Agricultural
				Million currency units		..... *Percent*			..... *Percent per year*						
Argentina . . .	Pesos	1971–75	C	...	38 721	2.4	...	...	7.0	4.6	...	9.2	7.0	2.2	— 0.2
Barbados . . .	EC $	1969–72	PS	—	46	35.0	—	11.0	8.0	2.6	...	...	...	...	— 2.7
Bolivia	Pesos	1962–71	C	12 289 324	...	...	11.0	7.0	6.3	...	...	...	...	...	...
Chile	Escudos	1967–71	C	...	...	...	...	...	4.7	3.5	...	...	...	...	...
Colombia . . .	Pesos	1970–73	C	[2] 24 520	[2] 8 223	...	...	39.3	7.5	5.4	...	6.1	...	4.4	2.1
Costa Rica . .	Colones	1969–72	C	...	1 426	...	...	...	7.7	...	...	...	...	...	...
Dominican Republic	Pesos	1970–74	C	...	530	...	...	...	6.6	...	...	...	...	...	...
Ecuador	Sucres	1964–73	C	41 007	17 713	...	16.0	7.0	6.2	6.6	...	...	...	...	...
El Salvador . .	Colones	1970–71	C	...	283	45.0	...	...	...	...	...	...	...	...	...
Guatemala . . .	Quetzales	1971–75	PS	1 868	...	29.7	...	...	7.8	...	...	3.8	...	...	...
Guyana	Guy $	1966–72	PS	294	...	...	...	32.0	5.6	...	...	...	...	...	...
Haiti	Gourdes	1970–71	PS	114	54	...	18.3	...	...	...	...	...	...	...	...
Honduras . . .	Lempiras	1970–75	C	...	...	...	...	...	...	...	...	...	...	...	...
Jamaica	J $	1970–75	PS	...	...	...	...	...	...	...	...	...	...	...	...
Nicaragua . . .	Cordobas	1970–74	PS	...	...	...	...	...	...	...	...	...	...	...	...
Panama	Balboas	1969–72	C	...	...	53.0	...	...	8.0	...	...	...	...	...	...
Paraguay. . . .	Guaranis	1971–75	C	...	...	24.5	...	...	6.0	5.3	...	7.4	...	...	...
Peru	Soles	1971–75	C	...	...	...	...	54.0	7.5	...	...	...	...	...	...
Surinam	Sur. guilders	1965–74	C	...	...	...	...	...	...	7.7	...	...	...	...	...
Trinidad and Tobago . . .	TT $	1969–73	PS	1 016	380	39.0	...	16.0	[3] 4.5	5.0	—	...	...	2.9	...
Uruguay. . . .	Pesos	1965–74	PS	56 144	18 057	...	14.0	...	4.7	4.2	...	...	...	...	...
Venezuela . . .	Bolivares	1970–74	C	33 600	26 400	...	...	...	6.5	...	...	...	...	...	...

NOTE: Where possible, data refer to net investment. In many cases, however, no distinction is made in the plans, and data may refer to gross investment or may include some elements of recurrent expenditure. The agricultural sector includes animal production, fisheries, forestry, irrigation, land reclamation, community development and agricultural extension.

[1] PS = public sector; C = comprehensive. – [2] 1958 pesos. – [3] GDP.

tion will receive a very low priority. To increase the availability of foreign exchange larger agricultural exports are planned, with an increasing share of "new" commodities, together with the substitution of food and raw material imports. A change in the income distribution in favour of small and medium farmers will be sought through an improved agrarian structure and the provision of credit, marketing facilities, extension services and rural infrastructure. Under the preliminary budget for the plan period, 37 percent of investment will be allocated to infrastructure projects, 22 percent to agricultural diversification programmes, and 20 percent to land tenure measures.

With the aim of integrating the rural population more actively into the economic, political and cultural life of the country, the Peruvian agricultural development plan for 1971-75 gives priority to a substantial increase in the level of rural income and greater social mobility. To this end major efforts will be undertaken (*a*) to complete the agrarian reform, (*b*) to increase agricultural production and thus achieve a higher degree of self-sufficiency and larger volume of exports, (*c*) to create a stable market with remunerative prices for the farmer and improved marketing facilities, (*d*) to utilize more intensively existing land and water resources, and (*e*) to consolidate the new structure of public administration for the agricultural sector. Over the longer term, a more dynamic agriculture is expected to provide opportunities in the market economy for today's subsistence farmers. It is realized, however, that part of the rural population will have to shift out of agriculture, and so development efforts are also oriented toward creating a more industrialized economy.

Of total public expenditure under Peru's agricultural plan almost 50 percent will be allocated to agrarian reform and settlement. Another 20 percent each will go to administration and agricultural extension, and the rest to irrigation (6 percent), agricultural research (4 percent), forestry, hunting and soils (3 percent) and marketing (2 percent). The large allocation for agrarian reform will enable the country to continue its efforts to overcome the problems of agrarian structure. Since the agrarian reform law was signed in June 1969 some 3.25 million hectares

of land have been expropriated or have reverted to state ownership, and official estimates suggest that nearly as much will be taken over during 1971-72. Nearly 1 million rural people will benefit from the redistribution of this vast area. As it will not be possible to give every peasant the minimum amount of land specified under the reform law (ranging from 7.5 hectares of arable land to almost 500 hectares of rough pasture), priority is being given to increasing the size of small farms to this minimum.

Major land reform measures are also being implemented in Chile. Under the present Government the benefits will be extended to medium and small operators, sharecroppers, and farm labourers. The reform will no longer operate on a farm-to-farm basis but by specific zones, and the Ministry of Agriculture and Agrarian Reform will exercise direct control over the regional agencies responsible for implementation. Farm workers — through unions — cooperatives and small farmers' organizations, will play an active role and will replace representatives of the large farms. The Government, in addition to distributing the land, also intends to reorient production patterns through the provision of supervised credit, extension work and land-use planning on regional and national levels.

In addition to medium-term development plans, documents spelling out longer term development strategies or general guidelines for action have been published in several countries. Bolivia's socio-economic strategy for national development covers the period 1971-91, and assigns the agricultural sector, which employs almost two thirds of the economically active population, a more active development role than in the past. In a first phase, up to 1975, social change is stated to be the major objective and agrarian reform its major instrument. During the second phase, from 1976 to 1981, the emphasis will be on strengthening the newly created economic, political and social structure, particularly at the farm level. By the end of the final phase it is expected that the rural population will be able to participate more actively in the economic, political and cultural life of the country. For the period as a whole, the production of crops and livestock is planned to increase at 4.5 and 8.2 percent a year, respectively, agricultural GDP at a rate of 5.2 percent, and the agricultural area by 3.1 percent a year.

In Brazil, which has not so far published a national development plan, a document on the goals and bases for government action was published in October 1970. It establishes policy guidelines for the period up to 1973. A more equitable distribution of income, the gradual correction of disparities in regional and sectoral development, and an annual increase in the number of jobs, from the present 2.9 to 3.3 percent a year by 1973, are the major aims. Details for 230 priority projects in all sectors of the economy have been elaborated and, with a suggested investment of 12 000 million cruzeiros (at 1970 prices), the share of agriculture in the total ranks fourth, after social security, education, and manufacturing.

Forest policies

The 1970 session of the Latin American Forestry Commission identified the weakness of forestry institutions as a primary obstacle to growth in the forest sector. A number of countries have recently taken measures to remedy this situation. Thus Brazil has reinforced its Institute for Forestry Development by establishing a research institute to study the bases for expansion of development activities. Chile has created a model forest service which has started operations in the central provinces (Bío-Bío region). Cuba has set up a Forestry Development and Utilization Institute.

A feature of great importance to Latin American forestry, with its large areas of heterogeneous tropical forest, is the study and determination of the technological characteristics of about 400 species effected in connexion with preinvestment surveys. A large number of additional commercial tropical species have been identified in these studies. Preinvestment surveys already carried out in Colombia, Ecuador, Guatemala, Guyana, Mexico, Nicaragua, Panama, Paraguay, Peru and Venezuela indicate that tropical hardwood offers very promising prospects for forestry development.

Latin America is rich in broadleaved but poor in coniferous forests, and about 2 million hectares of man-made plantations need to be established in the coming decade. Brazil has already made considerable progress in expanding afforestation, partly because of the recent law which allows private landowners to deduct investment in forest plantations from their taxable income, and permits companies to invest up to 42.5 percent of payable taxes in afforestation. The technical plans required for the establishment of plantations have led to the opening of some 80 forestry consulting firms. Brazil's first national forestry school, established in Curitiba seven years ago with United Nations Development Programme (UNDP) assistance, has helped greatly in this development, providing forestry professionals of high calibre.

Regional economic integration

Latin America remains in the vanguard of developing areas as far as regional integration is concerned. However, political difficulties or economic constraints continue to plague efforts to harmonize

economies which have a relatively undifferentiated structure of production, differing social and economic conditions and, in many countries, a tradition of high protectionism.

Efforts were continued within the Latin American Free Trade Association (LAFTA) to overcome difficulties encountered in the trade liberalization programme. To this end a plan of action for 1970-80 was adopted in late 1969 (the Caracas Protocol), and came into force in 1970. During the period of the plan a series of studies will be undertaken in an effort to find bases for the harmonization of national development policies. Among those relating to the agricultural sector several have been placed in the highest priority category. These include marketing and supply policies for agricultural products, especially through state and mixed organizations; norms for regulation of agricultural trade; common standards for plant sanitation and animal health; common standards of quality, standardization of packing, and harmonization of weights and measures systems; and possibilities for substitution of extrazonal imports. The acceptance of this programme of studies suggests that the need for joint action is being increasingly recognized. The formulation of a scheme based on the complementary ecological, climatic and seasonal features of the region is seen as the principal means of expanding trade in the area. In this connexion, a procedure has already been drawn up for the exchange of information on deficits and surpluses of agricultural products.

The Joint Advisory Group for Meat, established to advise LAFTA on all matters relating to the meat sector, held its third meeting in October 1970. Urgent problems including the promotion of intraregional trade, foot-and-mouth disease, and the implications of European sanitary inspection regulations were discussed.

In 1970 the Andean Group countries (Cartagena Agreement) began to deal with some aspects of the Agreement relating to the agricultural sector. A group of FAO experts undertook a preliminary study of agricultural trade within the group, to help its permanent secretariat assess the present situation and the possibilities for intensified exchange of agricultural products in the short and long term. While basic long-term prospects for increased trade among members are rather good, there are constraints to the rapid liberalization of trade flows, such as differing social conditions in the agricultural sectors; inadequacies in marketing and trade systems; disparities between domestic price levels; problems of plant protection, animal health, and quality control; and insufficient statistical and economic information. For these reasons, an approach on a commodity-by-commodity basis is likely to be favoured rather than general trade liberalization, at least for the most important or sensitive products. On the basis of the study, a list was subsequently prepared of agricultural products to which the safeguard clause included in the Agreement will apply.

In the meantime, the Commission of the Cartagena Agreement has taken a series of decisions aimed at strengthening the process of economic integration of the Andean subregion. It has agreed on a set of common regulations for foreign investment in the countries of the area, and decided to develop the petrochemical industry through common programming. Five multinational councils have been established to coordinate economic and social policies among member countries, covering agricultural and industrial programmes, planning, common trade policy toward third countries, and monetary policies. Finally, the Commission has established a list of products for which trade tariffs within the subregion are to be reduced by 10 percent annually, beginning 1 January 1971, with a view to their complete elimination by 1980. The initial list comprises 757 items, mainly nonagricultural commodities, but including cattle, meat, and dairy products.

Trade among the Central American Common Market (CACM) countries, which between 1968 and 1969 had fallen by 5 percent, increased in 1970 by about 18 percent. Nevertheless, and despite efforts made during 1970 in regional meetings, progress continued to be hampered by political difficulties. During the last months of 1970 a meeting of the Ministers of Economic Affairs of the CACM countries was convened to decide a *modus operandi* that would relaunch common market activities, and reach agreement on a set of measures covering, principally: the correction of imbalances in the intraregional trade of the deficit countries; the formulation of new agricultural and industrial development policies; the setting up of a fund for financing the expansion of agricultural and industrial production; and the drafting of general safeguard clauses. Although the effort unfortunately failed the meeting was nevertheless encouraging since it represented the first serious attempt in the history of CACM to tackle such basic issues. Once political difficulties are overcome, it is expected that the perspective plan for agricultural development and integration, now being prepared by an FAO advisory group (GAFICA), will help provide the technical basis for further efforts in that sector and contribute to the establishment of a common agricultural development policy in Central America.

The Council of Ministers of the Caribbean Free Trade Association (CARIFTA) met three times in 1970 (January, April and November), and made several decisions aimed at providing bases for closer integration among member countries. Major emphasis was given to the Agricultural Marketing Protocol

which had been devised to stimulate agricultural production and trade. As a first step toward its implementation, it was decided to organize a system for the effective flow of information among member countries regarding expected supply and demand of individual commodities, and to set up a system of price support for 22 products covered by the Protocol. Attention was also given to the provision of adequate transport facilities at competitive rates as an essential condition for the movement of perishable goods between CARIFTA territories. Recommendations were made for common quarantine policies and regulations in the agricultural and livestock trade. Studies on rationalization of agricultural production in the region have been proposed, and discussions held on the establishment of an integrated fisheries industry.

CARIFTA is in its early stages, and its impact on the trade of member countries cannot be determined yet. First indications suggest, however, that the new market opportunities have so far been of greatest benefit to Jamaica, and Trinidad and Tobago, and to a lesser degree to Barbados, Guyana and the other countries. Jamaica's exports to the rest of the area were 60 percent higher in 1970 than in the previous year, those of Trinidad and Tobago some 30 percent higher, while those of the other countries increased by about 10 percent.

Far East

DEVELOPING COUNTRIES

Overall, the economic performance of the Far Eastern developing countries in 1970 may be considered satisfactory. There was some acceleration over 1969 in the growth of real GDP in a number of countries, including India, Pakistan, Ceylon and China (Taiwan), and some of the growth rates achieved were notably high in absolute terms, for instance 6 to 7 percent in Ceylon, Malaysia and Thailand and about 10 percent in the Republic of Korea and in China (Taiwan).

Manufacturing made a major contribution to the large increase of GDP in the Republic of Korea and in China (Taiwan), where output of the industrial sector grew by 18 percent, compared to 3 percent for the agricultural sector. In most other countries of the region agriculture is still the dominant sector. Reduced agricultural growth held back the overall growth of the economy in 1970 in Thailand; in Malaysia, where floods and typhoons damaged crops at the close of the year; and in the Philippines, where it declined from 6.5 percent in 1969 to 4.4 percent in 1970, partly as a result of typhoon damage in October and November. In contrast, the satisfactory performance of agriculture in India, where in particular cereal and sugar production rose, made a good contribution to the 5 percent increase of national income.

Higher export earnings stimulated the economic growth of various countries, including Indonesia where they increased by 17 percent, the Republic of Korea (22 percent) and India (8 percent). In general, however, balance of payments problems continue to impede growth in the majority of countries in the region, notably Indonesia, the Philippines, Ceylon and Pakistan. In part, this reflects their continued heavy dependence on a limited number of agricultural products for export earnings, a vulnerability which was evinced by some developments in 1970, such as the poor markets for some crops and typhoon and flood damage to others.

Agricultural production

Agricultural production in the developing countries of the region again increased by 4 percent, thus matching the increase of 1969 and maintaining the slightly quickened rate of growth evident since 1967. All countries, with the exception of the Republic of Korea, Laos, and Sarawak in Malaysia, showed some growth in output, and increases substantially in excess of the total for the region were recorded for the Republic of Viet-Nam (9 percent) and Indonesia (7 percent), as well as for the Khmer Republic, where rice production recovered steeply. At the other end of the scale, output in Ceylon, Nepal, Pakistan, the Philippines and Thailand rose only by some 3 percent or less (Table II-23). Among the principal commodities, the greatest increases were in palm oil (20 percent), groundnuts (15 percent), and centrifugal sugar (13 percent). Jute production fell by 12 percent, but the output of kenaf rose by 10 percent. An increase of 10 percent was recorded for maize, as the Japanese demand for livestock feed is encouraging several countries, particularly Thailand but also Indonesia, the Khmer Republic and the Philippines, to expand production. Wheat output rose by 9 percent, and that

TABLE II-23. – FAR EAST:[1] INDICES OF AGRICULTURAL PRODUCTION

	1966	1967	1968	1969	1970 (preliminary)	Change 1969 to 1970	Per caput agricultural production in 1970
	1952-56 average = 100					*Percent*	*1952-56 average = 100*
PRODUCTION IN SELECTED COUNTRIES (all products)							
SOUTH ASIA	123	133	140	145	150	+ 3	103
Ceylon	140	147	152	151	156	+ 3	106
India	121	131	137	142	148	+ 4	103
Nepal	91	97	101	106	109	+ 3	81
Pakistan	134	145	154	162	163	+ 1	103
EAST AND SOUTHEAST ASIA	151	148	155	164	171	+ 4	113
Burma	120	137	142	145	148	+ 3	108
China (Taiwan)	163	172	177	177	185	+ 5	119
Indonesia	124	118	128	129	138	+ 7	95
Khmer Republic[2]	145	154	185	162	200	+ 24	131
Korea, Rep. of	184	168	167	190	191	—	125
Laos	163	175	172	180	180	—	123
Malaysia							
Sabah	139	143	159	172	174	+ 1	102
Sarawak	139	121	126	159	131	— 18	86
West Malaysia	159	163	180	202	208	+ 3	129
Philippines	151	147	148	163	167	+ 2	99
Thailand	214	187	196	215	220	+ 2	136
Viet-Nam, Rep. of	158	165	156	173	188	+ 9	127
JAPAN	137	153	162	159	160	—	136
PRODUCTION IN DEVELOPING COUNTRIES[3]							
Total							
All products	135	141	148	155	160	+ 4	
Food only	135	141	149	156	162	+ 4	
Per caput							
All products	102	103	106	108	109	+ 1	
Food only	102	103	107	108	110	+ 2	
REGIONAL PRODUCTION[4]							
Total							
All products	135	142	149	155	160	+ 3	
Food only	136	143	151	156	162	+ 4	
Per caput							
All products	104	106	109	110	111	+ 1	
Food only	104	106	110	111	113	+ 1	

[1] Excluding mainland China. – [2] Formerly Cambodia. – [3] Excluding Japan. – [4] Including Japan.

of rice by 4 percent. The regional output of livestock products again showed little overall increase;[15] poultry production rose, however, by 3 percent, and the output of beef and veal by some 2 percent. Tea showed a slight increase, while tobacco and coffee production remained practically unchanged.

The 4 percent increase in India was to a large extent a reflection of a further sizable growth in production of rice, up by 5 percent, and wheat (8 percent), but important contributions were also made by larger increases in production of centrifugal sugar (20 percent), maize (15 percent), kenaf (8 percent) and a recovery in the output of groundnuts (18 percent) after two adverse years. Livestock production, on the other hand, is estimated to have risen only relatively slightly. In Pakistan, the rice crop was damaged by the cyclones that hit the east in 1970, and total output is estimated to have fallen by about 7 percent. Although production of wheat again increased by 10 percent and centrifugal sugar by about half, the smaller rice crop together with a 12 percent drop in jute production held back the overall growth of agricultural production.

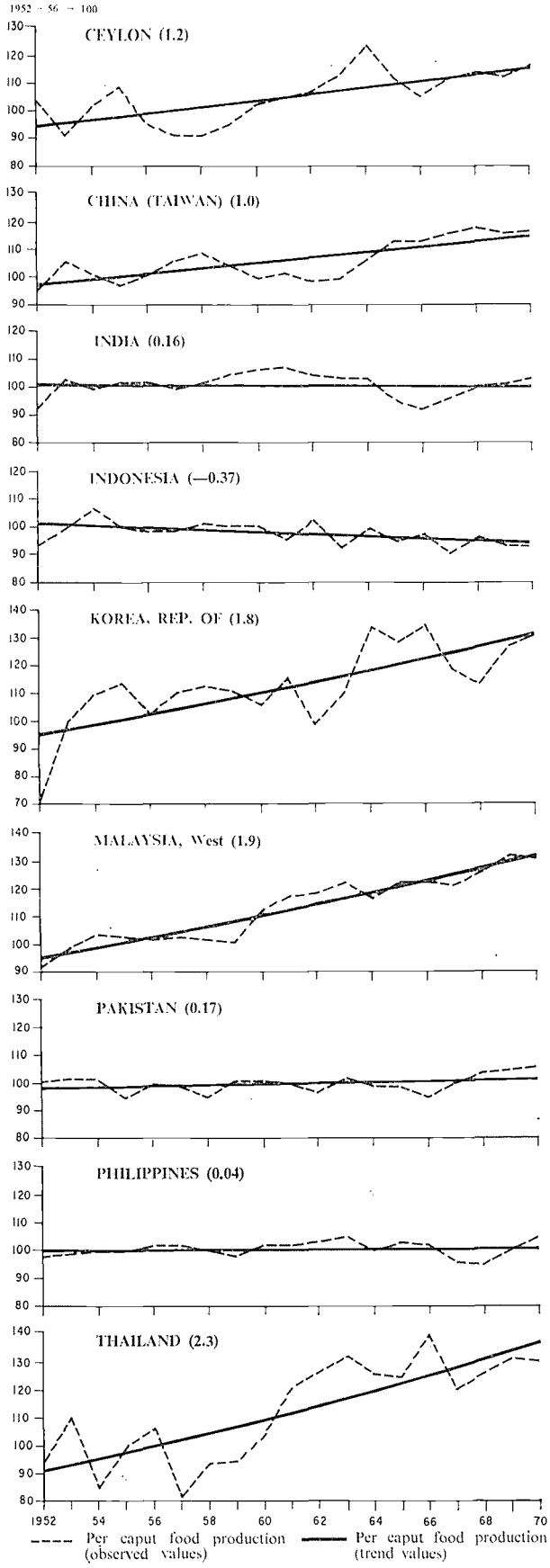
The 24 percent increase in the Khmer Republic was due to a strong recovery (by 52 percent) in rice production which accounts for two thirds of total output, after a steep fall in 1969 because of drought, and a 16 percent increase in maize production. The large increase in the Republic of Viet-Nam reflects more settled conditions in the rice-producing areas which are being rapidly planted to high-yielding varieties. The 2 percent rise in the Philippines reflected mainly increases in sugar (7 percent) and copra (6 percent). Paddy production rose only slightly, as early hopes for a large increase were dashed by typhoon damage, while the output of most other crops was lower. No rice imports were necessary in 1970, but shortages have arisen in 1971 and prices have gone up; the Government therefore has authorized imports of 360 000 tons in 1971. In Indonesia, the main components of the large increase in total production were the rises in output of 10 percent for paddy and 7 percent for maize. Rubber output rose by only 3 percent, while that of copra remained unchanged.

In Ceylon, overall production has shown little improvement since 1968. Paddy production increased in 1970 by 18 percent, after showing little increase the year before, but output of both copra and tea was down. In the Republic of Korea, despite a substantial increase in the minimum support price for paddy, rice production decreased by nearly 5 percent in 1970. With the wheat crop also reduced, only the rise in output in the livestock sector, particularly poultry and eggs where the level is now 2 to 3 times that of 1966, kept the country's total production from declining. In West Malaysia, rice production increased by a further 5 percent, that of copra by 12 percent and palm oil by 24 percent, but overall production growth was held back by the virtually unchanged output of rubber, because of bad weather and falling prices. Output growth in Thailand was held back by the failure of rice production to increase. In China (Taiwan), on the other hand, rice production recovered from typhoon and flood damage in 1969, but production of sugar, bananas and sweet potatoes was smaller.

The recent trends in the region's food production reflect very largely those of India and Pakistan, both

[15] See *The state of food and agriculture 1970*, p. 88.

FIGURE II-3. – ASIA AND FAR EAST: TREND OF PER CAPUT FOOD PRODUCTION IN SELECTED COUNTRIES, 1952-70



because of their size and the rapid increases recently achieved, particularly in the production of wheat. In India, the production of all foods between 1967 and 1970 increased at a rate of 5 percent a year, and wheat production, which showed a steep increase in 1968, at an annual rate of 21 percent. In Pakistan, wheat output increased between 1967 and 1970 at a rate of 19 percent a year, and rice at 3.3 percent, contributing to an overall annual increase in food production of 4.7 percent.

Trends in production of other foodstuffs have not been equally encouraging as those for cereals. As can be seen from Figure II-3, in several of the major countries the long-term (1952-70) trend of per caput food production has been level (India, Pakistan, the Philippines) or declining (Indonesia). Only in Thailand, Malaysia and the Republic of Korea can the increase be said to have been sufficient to provide for significant improvement in food consumption standards, and in the case of Thailand much of the increase has been in food produced for export, rather than for domestic consumption. In India, the 9 percent fall between 1957-59 and 1967-69 in the output of pulses, an important source of protein in that country, has been a serious setback and the production of vegetables, meat, eggs and milk has also increased less rapidly than population. The recent acceleration in cereal production is largely responsible for the improvement evident in the last few years, but even so, according to the preliminary figures, per caput food production in 1970 was barely above the trend line. The improvement in the last few years has been somewhat greater in Pakistan, but over the longer term the trend has been virtually stagnant, reflecting steady or declining rates of per caput production of such major foodstuffs as pulses, vegetables, meat and milk. In the Philippines, the trend has been very similar. Output of vegetables, eggs and root crops has about kept pace with population since 1952, but no significant increase has occurred in either meat or milk production.

Countries which have shown a greater increase in food production per caput have generally done so on a relatively broad base. Thailand is an outstanding example, but the same applies also to the Republic of Korea and China (Taiwan), where the increases have been mainly from foods other than their staples. During the decade 1957-59 to 1967-69, the production of eggs in the Republic of Korea increased at a rate of 13.5 percent a year and in China (Taiwan) at 9.2 percent. The corresponding increases for milk were 33 and 16 percent and for vegetables 6.7 and 5.3 percent. Increases in Malaysia have been more remarkable since they

NOTE TO FIGURE II-3: The figures in parentheses indicate the annual compound percent rate of growth of per caput food production on the trend line shown.

have been obtained in the context of a dual economy where a major part of the land has been tied to perennial nonfood plantation crops.

The fact that total food production per head is expanding so slowly in spite of encouraging progress in cereal output is an indication of the magnitude of efforts that have to be made if food consumption levels are to be raised without renewed recourse to imports. This will require not only continued efforts to consolidate and spread further the techniques related to high-yielding varieties of cereals, but also acceleration in output of other foodstuffs for which demand will increase rapidly as incomes rise, such as livestock products, fats and oils, and sugar.

The continued precariousness of the progress is also suggested by the first indications of production results in 1971. These, admittedly highly tentative data, suggest that the growth of agricultural production in the developing countries of the region may have been only of the order of 2 to 3 percent, which would be substantially less than in recent years, and barely in line with the growth of population.

Among the major countries, India is expected to show once again an increase in total agricultural production well in excess of population growth. Another large gain — some 15 percent — is reported for wheat, as a result of good weather and further expansion of area under high-yielding varieties, and smaller increases in output of rice and millet and sorghum. Thanks in part to the good production results, in part to imports, the country has been able to build up a buffer stock of 8.6 million tons of grains and has decided to discontinue grain imports on concessional terms after the end of 1971. Little change appears to have taken place in the country's sugar production, but that of oilseeds is estimated to have increased by some 3 percent. Among nonfood crops, the production of cotton, jute and kenaf recovered steeply.

For Pakistan, the harvest results appear less satisfactory in 1971, and total agricultural production is likely to fall back by several percentage points. In part, this reflects the natural conditions, namely a drought in West Pakistan, which is estimated to have reduced wheat production by over a tenth to some 6.5 million tons, and a cyclone followed by a tidal wave in East Pakistan. The latter and the civil disturbances are estimated to have reduced the country's total rice crop by about 10 percent, to less than 12 million tons (milled). The country's jute production was also seriously affected, falling by possibly one third from the already reduced level of 1970.

Less information is available on the other developing countries of the region. Indonesia's foodgrain production is expected to show a further increase mainly because of a larger rice crop. In the Philippines, on the other hand, output in 1971 may be smaller because of the outbreak of a virus disease among some of the new high-yielding rice varieties which has already hurt production and will most likely affect the main harvest to be gathered toward the end of the year. Coming on top of typhoon damage earlier in the year, this has led to the necessity for the country to contract for substantial rice imports in 1971, while efforts are being made to shift to new varieties resistant to the virus. In Ceylon, too, rice production is likely to be less than in 1970. Among rice exporters, output in Burma is thought to remain more or less unchanged, but some increase is likely in Thailand.

High-yielding cereal varieties

The growth of wheat and rice production, which accelerated from 1967, continued in 1970, although more slowly: for all the developing countries of the region the increase is estimated at 8 percent for wheat and 6 percent for rice, compared with 10 and 4 percent, respectively, in 1969, and 43 and 6 percent in 1968. These increases have been largely due to the introduction of high-yielding varieties of the two cereals, together with locally bred improved

TABLE II-24. – FAR EAST: TOTAL CROP AREA AND AREA UNDER HIGH-YIELDING VARIETIES OF WHEAT AND RICE IN SELECTED DEVELOPING COUNTRIES IN 1969/70

	Total area	Area under high-yielding varieties	Area under high-yielding varieties as percentage of total
	Thousand hectares		*Percent*
WHEAT			
India	16 000	6 111	38.2
Nepal	388	75	19.3
Pakistan	6 219	2 833	45.6
RICE			
Ceylon	671	26	3.9
India	38 000	4 371	11.5
Nepal	1 174	50	4.2
Pakistan	12 076	765	6.3
Burma	5 018	144	2.9
Indonesia	7 972	749	9.4
Laos	769	2	0.3
Malaysia (West)	526	128	24.3
Philippines	3 100	1 354	43.7
Viet-Nam, Rep. of	2 519	202	8.0

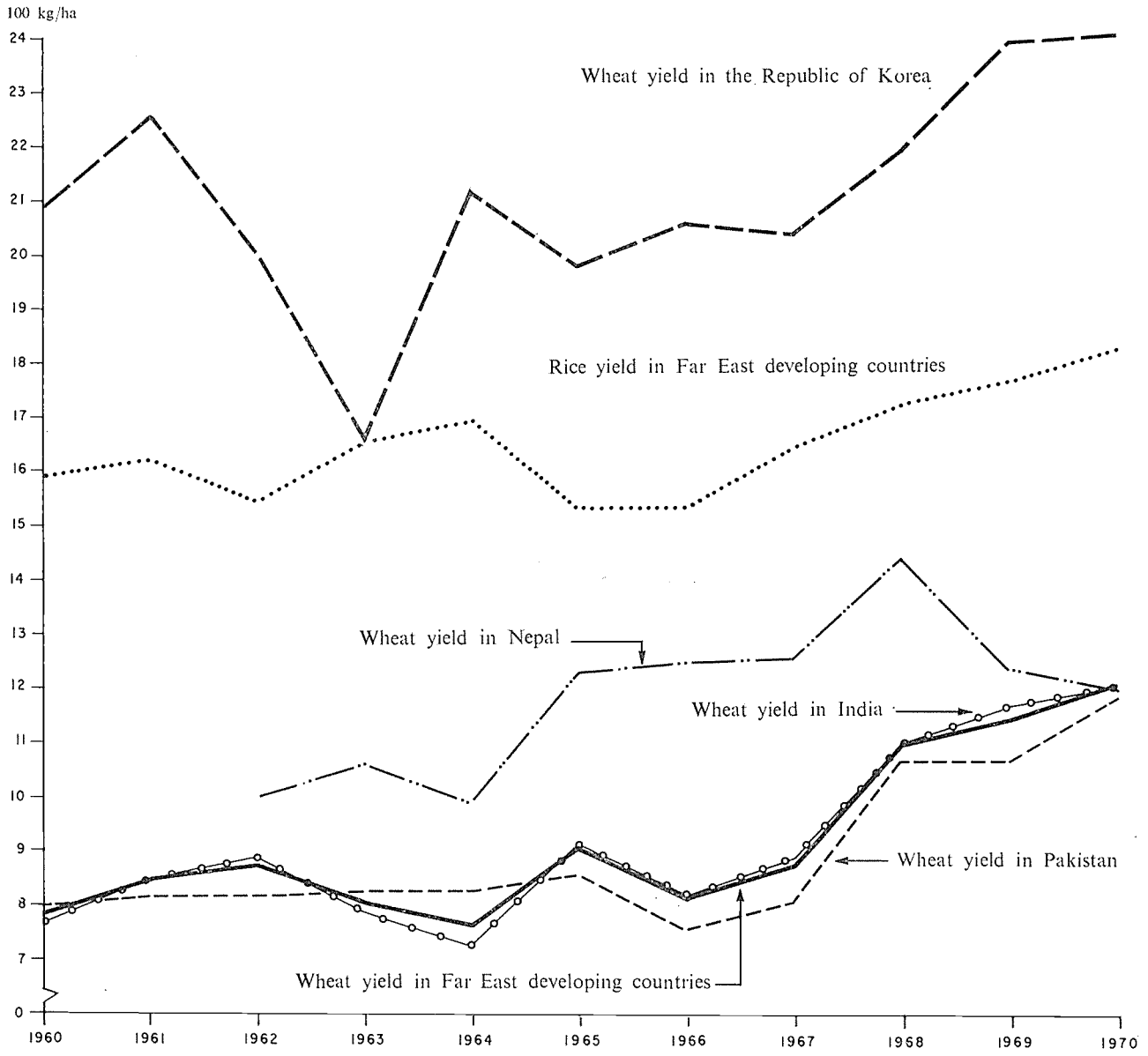
SOURCE: U.S. Department of Agriculture. *Imports and plantings of high-yielding varieties of wheat and rice in the less developed nations.* Washington, D.C., 1971. Foreign Economic Development Report No. 8.

NOTE: Varieties included are (*a*) dwarf and semidwarf varieties developed at the International Wheat and Maize Improvement Centre (CIMMYT) in Mexico and the International Rice Research Institute (IRRI) in the Philippines, and (*b*) direct descendants of these varieties developed in national breeding programmes. The definition thus excludes a number of local improved seeds not derived from the CIMMYT and IRRI varieties. For further details of definition, see the source.

varieties, supported by the expansion of irrigation, the heavier use of inputs and higher standard of husbandry. Weather conditions have also been generally favourable since 1966, except for the cyclones and typhoons which caused losses in 1970. Table II-24 shows the area of coverage of high-yielding varieties of wheat and rice in the developing countries of the region.

The impact of the high-yielding varieties on foodgrains has been most striking in respect of wheat, as can be seen from Figure II-4 which shows the regional average yields of rice and wheat during the period 1960-70. Wheat production is, however, confined mainly to India, Pakistan, Nepal and the Republic of Korea, and the steep increases in wheat yields have thus not had a regionwide impact. It is clear from the figure that wheat yields have shifted to a much higher plane since 1968. Between 1967 and 1968 this brought an increase in output of 2.2 quintals per hectare (25 percent), to which was added another quintal per hectare by 1970. In that year, 68 percent of the total increment in production originated from increases in yields. Although the contribution of yields was somewhat less than in the two preceding years, it was very much more than in the years prior to 1967. Figure II-4 shows that there is still a wide gap in average yields between the Republic of Korea on the one hand, and India, Pakistan and Nepal on the other. But it also shows the very striking rate of increase in yields

FIGURE II-4. – FAR EAST: REGIONAL AVERAGE YIELDS OF WHEAT AND RICE, AND YIELD OF WHEAT IN SELECTED COUNTRIES, 1960-70



in the latter countries, a change which has helped to make West Pakistan self-sufficient in wheat and brought India close to that goal.

The recent rapid increase of wheat yields in India and Pakistan seems to suggest that the achievement of the higher yield level of the Republic of Korea (24 quintals per hectare) is not unattainable. The high-yielding varieties of wheat have found a favourable environment in the comparatively dry and sunny climates of north India, Pakistan and Nepal, where they are also less prone to pest and disease attacks than is rice, which is grown mainly in the more humid tropics. Also important has been the stable water control in the areas under wheat, 65 percent being irrigated as opposed to only 20 percent for rice. Other factors which have favoured the quicker and wider adoption of new varieties of wheat than of rice include their satisfactory milling qualities and readier acceptance by consumers compared with some of the earlier high-yielding rice varieties, and the fact that a greater portion of wheat lands are held by larger farmers with greater risk-bearing ability and with easier access to required inputs and institutional support measures of governments. As a result, as much as 40 percent of the total regional area under wheat was planted to high-yielding varieties in 1969/70, as against only 11 percent for rice.

Rice, however, is the major cereal in Asia. Its total output is more than six times that of wheat, and the area under it is five times as large. Its production thus involves far more people and any increase will have a correspondingly greater impact on employment, incomes and agricultural technology. Consequently, in addition to providing a direct boost to production in the region, high-yielding varieties of rice have also had an indirect positive effect on the level of technology and crop husbandry by making farmers more receptive to the idea of change. In contrast to wheat, which witnessed a sudden shift to a higher level of technology in 1968, in several countries there had been a steady increase in rice production and yields since the 1950s, long before the introduction of the high-yielding varieties in 1966-67. Although yield increases continue since 1967 to account for a greater proportion of additional production than the expansion of area (58 percent in 1970), their impact has not been as striking as in the case of wheat.

Nor can the still comparatively small area of rice under high-yielding varieties by itself account for the large increases in production since 1967. Since they are generally being used on the most fertile lands with best irrigation facilities, where fairly high yields had already been achieved and local improved varieties already frequently used, it may be estimated that no more than 40 percent of the subsequent increase in yields achieved on the lands under high-yielding varieties can be ascribed directly to them.[16] It appears realistic to assume, moreover, that such lands were already yielding approximately 40 percent more than other, less fertile and less well irrigated lands. The net contribution of high-yielding varieties to total rice production in 1970 would, on this basis, be a maximum of 22 percent. This is by no means an insignificant contribution, and is enough to tip the scales toward early self-sufficiency. It does suggest, however, that other factors too have made important contributions to the increases in production and yields in many countries. These may include the comparatively good weather since 1968, the increased irrigation spurred on by the high-yielding varieties, the longer term gradual improvement in technology since the 1950s, and in particular the increasing use of locally bred improved varieties in large areas in which the classical high-yielding varieties cannot flourish. This is specially true of Ceylon, Indonesia and Malaysia, which had hitherto used little of the new high-yielding varieties[17] but had nevertheless achieved relatively high national average yields.

An examination of the present and potential constraints to the expansion of the high-yielding varieties may serve to pinpoint the most promising areas for future efforts. Only 20 percent of total rice land (compared to 65 percent of wheat land) is at present irrigated.[18] This in itself acts as a constraint on the expansion of high-yielding varieties, until more land is brought under irrigation, or more adaptable varieties are bred. In addition, irrigation as such is not sufficient for the best results from the new varieties; what is needed is adequate water control. Under the irrigation systems prevailing in much of Asia, individual farmers cannot control the timing and quantity of water in their fields in a manner that enables them to take full advantage of the fertilizers and agrochemicals used, and otherwise plan properly their cultivation operations. Full control of water not only increases yields,[19] but also saves water, thus permitting an expansion of the irrigated area. It is especially necessary for double or multiple cropping, which, considering the shortage of farmland in

[16] It is extremely difficult to ascribe the yield increases to any specific component of the new technological package. As a rough measure it may be estimated that about 45 percent of the total additional yield can be attributed to intensified irrigation (the high-yielding varieties have brought about a greater intensification of irrigation), 25 percent to fertilizer use, 15 to 25 percent to the genetic potential of the new high-yielding varieties (almost half of which can be achieved by local improved varieties) and a further 3 percent to the genetic purity of the seed used. The 40 percent increase postulated in the text assumes that high-yielding varieties are used in conjunction with at least part of the package of prescribed inputs.

[17] See FAO. *The state of food and agriculture 1970*. p. 83. Rome. 1970.

[18] The distribution of rice area by land type and irrigability in south and southeast Asia has been classified as follows: irrigated 20 percent, rainfed 60 percent (of which 10 percent is under deep water) and upland 20 percent. Randolph Barker, Green Revolution. *Current Affairs Bulletin*, 45 (5), January 1970.

[19] Wheat cultivated in the dry season under controlled irrigation in West Pakistan can give yields equally high as rice.

the Far East, would seem to be the logical way for expanding the cereal area and for crop diversification. However, the susceptibility of high-yielding varieties to disease, especially in the conditions of high humidity of tropical Asia, is aggravated under continuous cropping, a problem at present confronting the double cropping programme of Malaysia.

The institutional and structural constraints to wider and more rapid adoption of the high-yielding varieties — particularly the preponderance of small farms and the insufficiency of services to bring the new technology to them — were discussed in the 1970 issue of this report.[20] Further constraints may emanate from the demand side. As more countries pursue policies of self-sufficiency the resulting production increases, especially where surpluses emerge, will depress prices and discourage farmers from further production.

Action to remove these various constraints is being taken by governments and farmers in the region. Rice land in China (Taiwan) and the Republic of Korea is now almost fully irrigated. Elsewhere, irrigation construction has been accelerated, with emphasis on low-cost, quick-yielding works. In order to improve water control there has been an increase in exploitation of groundwater sources through tubewells, an inherently controllable form of irrigation which also provides a quick payoff. India hopes to extend such irrigation to about 11 million hectares by 1974. In East Pakistan, the plan for tubewells and power pumps envisages an extension of irrigation by 1974/75 to an additional 1.4 million hectares, of which 425 000 were to be put under high-yielding varieties of rice. In West Pakistan, an area of 1.1 million hectares was brought under tubewell irrigation between 1964/65 and 1969/70, and present plans call for an additional 36 000 tubewells by 1974/75, bringing new irrigation to 500 000 hectares. On a further 2.5 million hectares of already irrigated land, improvements are to be made in irrigation and water control.

As for multiple cropping, whereby high-yielding varieties can be grown in rotation with other crops, India hopes to increase the area from the present 6 million hectares to 15 million by 1974. In Malaysia, programmes for extending double cropping of rice to 200 000 hectares are being implemented, mainly under the Muda irrigation scheme.

Efforts also continue to produce more disease-resistant and better tasting rice varieties. Aside from IR20 and IR22, which have not been successful everywhere, progress has been made in breeding locally adapted varieties under national breeding programmes, often using International Rice Research Institute (IRRI) varieties as one parent. In Malaysia, the Mahsuri and Bahagia varieties are reported to have proved quite successful, and Thailand has recently announced the release of locally improved varieties more suited to the country's poor drainage conditions. In further breeding work it is also important to maintain or increase the protein content of the cereals, and to improve the quality of the proteins they contain.

In the institutional area, most countries continue their policies of price support, liberalized credit and subsidized inputs. India and Pakistan have, however, reduced their fertilizer subsidies. To promote the adoption of high-yielding varieties by small farmers, India has established a Small Farmers' Development Agency with schemes in 55 districts to deal specifically with the infrastructure and institutional problems of small farmers. In Indonesia, the Bimas (mass guidance) rice intensification programme (now under revision; see Chapter I) provided small farmers with the new seeds and complementary inputs which has enabled a switch to the high-yielding varieties and to improved domestic varieties.

The main problem in most countries of the region is still that of maintaining the momentum of production growth, in view of the inexorable expansion of food needs arising from rapid population growth. In some countries, however, thought is already being given to adjustments which will be necessary once self-sufficiency in rice or wheat has been reached. In the case of rice this has become more important because of the depressed situation in export markets, which is expected to continue in the medium term. Malaysia has already scaled down its rice production goal to 90 percent of domestic requirements, so as not to have exportable surpluses to dispose of in years of above-average harvests.

Some quantities above immediate requirements can be usefully diverted to stocks for emergency and price stabilization purposes, and India is now practising this, although partly through imports. In the main, however, the solution will need to be sought through diversification of production, including expansion of livestock products, and this will be a policy problem of increasing importance in a number of countries in coming years.

There has also been increasing preoccupation about the socioeconomic consequences of the wider use of high-yielding varieties, in particular the increasing income disparities among regions, classes of farmers and individual cultivators, depending on whether or not they have been able to adopt the new technology. In some countries, such as Ceylon and Malaysia, the problems have been less acute, since measures have been taken from the start to involve, as far as possible, the smaller producers. In India, remedial measures include the Small Farmers' Development Agency already mentioned, and special

[20] FAO. *The state of food and agriculture 1970*. p. 83-84. Rome, 1970.

schemes for research and institutional development to benefit the country's dry farming and poor rainfall areas. In other countries, however, there would seem to be little evidence of specific action taken, and measures of this nature will require increasing attention in the future.

Fishery production

The developing countries of the region increased their catch of fish and shellfish in 1970 by some 8 percent, to a total of 9.4 million tons. The four leading fish-producing countries of the region are India, Indonesia, the Philippines and Thailand. Each of them catches more than 1 million tons of fish, predominantly from coastal and inland fisheries. Coastal fishing has, however, in many places reached an economic limit, and these countries are investigating the feasibility of establishing high seas operations. In India, which with a production of over 1.6 million tons has risen to eighth place among the fishing nations of the world, a government-sponsored symposium has recently drawn up a comprehensive programme for deep-sea fishing development. To support these operations and to increase the distribution radius for fish and fishery products in domestic markets, substantial infrastructure development is under way. More emphasis also is being placed on the promotion of inland fisheries which are nutritionally important in areas where other sources of animal protein are scarce. Shrimp fishing, which accounts for a negligible share of the total catch but is a very important foreign exchange earner, has expanded further, although pressure on resources has in some places reached danger level.

Development in most of the other countries in the region has proceeded along similar lines. Infrastructure construction has been accorded a very high priority. In the Philippines a new fishing harbour is to be built not far from Manila to permit an expansion of fish freezing and domestic and export marketing operations. The Republic of Korea and China (Taiwan), which have been carrying on high seas operations for some time, have become serious competitors of some major fish producing and exporting countries. Fish production in the two countries increased by some 10 percent in 1970, in keeping with the steep upward trend of recent years. Notable progress was also achieved by the Republic of Viet-Nam, where output increased by almost 25 percent.

Forest production

Removals of saw and veneer logs continued to increase rapidly in the developing Far East in 1970 to over 50 million cubic metres. Broadleaved sawlogs are estimated to have accounted for almost 80 percent of total production of industrial roundwood. The rest is largely pulpwood, poles and posts; coniferous sawlogs represent less than 5 percent of total production and are declining. The total quantity of fuelwood removed from forests in the Far East is still two and a half times as large as industrial roundwood, but is growing more slowly.

Much of the current expansion of industrial roundwood production comes from the newly opened forest areas in southeast Asia, particularly the large-scale operations in Kalimantan, Indonesia. More than half of the region's broadleaved log production is exported, and sluggish market conditions in Japan toward the end of the year had a depressing effect on log production in most exporting countries. However, they did not have any repercussions on the production of primary forest products. The output of broadleaved sawnwood, by far the largest single item, increased by about 4 percent, with a particularly large increase (10 percent) in Malaysia. Plywood production increased more slowly than in recent years but remains one of the most promising sectors for industrial development in forest-rich countries. Except for newsprint, which is increasing rather slowly, there has been a notable growth in the production of paper and paperboard, but this is based largely on imported pulp as local supplies, particularly of long-fibre pulp, are insufficient.

Trade in agricultural, fishery and forest products

According to preliminary data, the region's export earnings from agricultural, fishery and forest products increased by some 5 percent in 1970. The value of exports of agricultural products is estimated to have increased at about the same rate, with larger earnings from sugar, oils and oilseeds, and beverages only partly offset by losses from rice, rubber, and jute and kenaf (Table II-25).

World rice markets were characterized by increased exportable supplies, low import demand, and a steep fall (18 percent) in export unit values. The volume of world rice trade increased by 8 percent, but most additional exports came from the developed countries, with Japan and Italy roughly doubling theirs, while exports from developing countries increased by only 2 percent. The volume of exports from the developing countries in the Far East, however, rose by more than 15 percent, because of larger shipments from Burma, the Khmer Republic and Thailand. As prices were lower, the value of the region's rice exports fell (by 10 percent) for the fifth consecutive year. Earnings from maize exports were greater, reflecting higher prices and an expansion in shipments from Thailand, which now exports more maize than rice.

TABLE II-25. – FAR EAST:[1] INDICES OF VALUE OF EXPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	Share of total agricultural exports in 1970	1966	1967	1968	1969	1970[2]	Change 1969 to 1970
	Percent	*1957-59 average = 100*					*Percent*
AGRICULTURAL PRODUCTS	75	106	101	100	103	108	+ 5
Food and feedstuffs	30	140	128	128	118	134	+ 14
Rice	(5)	113	106	86	71	64	— 10
Sugar	(7)	118	108	117	121	142	+ 17
Oil and oilseeds	(10)	131	113	132	109	143	+ 31
Beverages and tobacco	16	98	111	103	92	105	+ 13
Coffee	(3)	128	192	170	188	242	+ 28
Tea	(9)	85	91	83	68	78	+ 15
Raw materials	29	86	77	79	96	90	— 7
Jute and kenaf	(4)	159	144	119	112	109	— 2
Rubber	(22)	77	65	67	95	86	— 9
FISHERY PRODUCTS	4	237	267	298	343	390	+ 14
FOREST PRODUCTS	21	358	414	531	681	707	+ 4
Sawlogs	(14)	392	465	572	772	831	+ 8
Wood-based panels	(4)	788	907	1 291	1 515	1 462	— 3
Agricultural, fishery and forest products	100	118	115	120	129	135	+ 5

[1] Excluding Japan, mainland China and other Asian centrally planned countries. – [2] Preliminary estimates.

After an upswing in late 1969 and early 1970, there was a steep decline in natural rubber prices through most of 1970, following the slowdown in demand from some major industrial countries. Rumours from the beginning of the year, and the eventual announcement that releases from the United States strategic stockpile would be resumed, worsened the situation. Export unit values were about 10 percent lower than in 1969, and as export volume was only marginally higher value fell by 9 percent. The impact was greatest on two of the three major natural rubber exporters, Malaysia and Thailand, and on the Khmer Republic (a relatively minor exporter) whose earnings fell by some 70 percent due to the war. The " rubber for rice " trade agreement, under which a substantial proportion of Ceylon's rubber production is exported to mainland China at prices several cents a pound above those quoted at Singapore, continued in 1970 and is to remain in force in 1971.

Export earnings from jute declined again, for the fourth consecutive year. Although export availabilities fell short of reduced world demand, prices remained within the range recommended by the Consultative Committee on Jute, Kenaf and Allied Fibres for most of the season thanks to the payment of export bonuses in Pakistan (through the bonus vouchers scheme) for raw jute exports. Prices of Thai kenaf fluctuated widely during the year but were generally above the recommended range. Pakistan's raw jute exports decreased due to rising domestic mill consumption, reduced supplies and the continuation of the downward trend in import demand. Since March, when civil disturbances started in East Pakistan, exports have been virtually at a standstill. Thanks to abundant stocks, exports from Thailand were slightly larger despite the fact that poor weather reduced the size of the crop.

The large increase in earnings (over 30 percent) from oils and oilseeds, which constitute some 10 percent of the region's agricultural exports, was due in part to higher average prices, which reflected strong import demand as a result of reduced output and/or low stocks in a number of importing countries. Overall, the volume of exports rose by about 7 percent. Shipments of coconut oil were almost 50 percent higher, primarily because of a sharp rise in those from the Philippines, but exports of other oils and oilseeds were lower, reflecting in part the trend toward increasing domestic consumption in exporting countries.

The rise in the volume of sugar exports from the region, despite the sharp reduction in shipments from China (Taiwan), reflects the larger crops in India and the Philippines. The value of exports was up by almost 20 percent. After a drop in 1969 both the volume and value of tea exports were also higher, with the biggest increase in India. Coffee exports were greater, and with high world prices (higher than at any time since the middle or late 1950s) there was a substantial increase in export earnings.

On the import side, the volume of trade increased substantially (12 percent) in 1970 under the influence of a sharp rise in cereal imports, after two years of decline from the peak level reached in 1967. Imports of wheat and rice rose by almost 20 percent. This increase appears, however, to be a reflection of short-term factors, including the relatively low prices and increased availability on concessional terms which induced some countries to build up stocks, rather than a reversal of the recent trend. Imports on concessional terms by Indonesia, Pakistan and the Republic of Viet-Nam, for instance, were all larger; those of India remained substantial and contributed to the 11 percent increase in wheat imports. The latter have been maintained at a relatively high level despite the record level of foodgrain production in 1970 in order to build an adequate buffer stock. By 1971, in fact, the original target of 5 million tons appears to have been exceeded and no further imports on concessional terms are planned. The country's rice imports were reduced by 60 percent

to slightly more than 200 000 tons, with stocks being built from domestic supplies. In the case of Pakistan, imports of wheat and rice had to be expanded following the heavy cyclone damage in East Pakistan. More rice was imported also by the Republic of Viet-Nam (up by 70 percent to 552 000 tons); by Ceylon, where the subsidized rice ration was doubled, and imports rose by 50 percent to 480 000 tons; and by Indonesia, where domestic policies favoured an increase in consumption and imports were increased, by about a third to 950 000 tons, despite larger production. Among other foods, imports of fruit and meat each rose by 12 percent, and soybeans and soybean oil by some 30-40 percent, largely reflecting the upward trend in concessional shipments to India and Pakistan. Purchases of sugar and dairy products are estimated to have been slightly lower.

The region's earnings from fishery exports are preliminarily estimated to have increased by about 14 percent in 1970. Important gains were achieved by both the Republic of Korea and China (Taiwan), which are among the countries with the most rapid growth in this sector. Their exports, and those of India, have more than doubled in value since the mid-1960s. The export earnings of the Republic of Korea were over 20 percent larger. Sales of tuna products accounted for almost one third of the value of shipments, the remainder being made up by a large variety of products including seaweeds, squid, mackerel and shellfish. The principal customer for Korean fishery exports is Japan which is relying increasingly on supplies from elsewhere in the region to cover its needs. The growth of this trade would have been even larger had it not become necessary for Japan to impose temporary restrictions on certain products in late summer and autumn because of the outbreak of a cholera epidemic in the Republic of Korea.

The growth of exports from China (Taiwan) is attributable in an even larger measure to tuna operations. The country's tuna industry has become the third largest in the world, after Japan and the United States. The principal market outlets are in Japan but tuna is exported in increasing quantities also to North America and Europe.

India failed to match the 1969 volume and value record of shrimp exports to the United States, but remained that country's largest supplier after Mexico. In contrast Pakistan, which ranks next in the region among shrimp exporters to the United States, recovered in 1970 most of the ground lost in this market during two years of declining exports. In addition to shrimp, the exports of which are valued at over $10 million a year, Pakistan also sells a variety of dried, salted and speciality fish items in demand in the developing countries of the region. Expansion of trade in recent years has been held back by natural catastrophes, and financial and political factors extraneous to the fisheries sector. In the years immediately before 1965 Pakistan was among the developing countries making the most rapid progress in fisheries trade.

Import substitution continues to be a major objective of fisheries policy in the Philippines and in Ceylon. In the Philippines there has been no further growth in imports from the peak of over $21 million in 1967, and the country has made some progress in an export expansion programme based primarily on tuna and shrimp operations. Ceylon's imports have begun to decline but exports continue to be of modest size.

Southeast Asian countries increased their log exports in 1970 by almost 3 million cubic metres, thus continuing the rapid expansion of log trade which has prevailed since the 1950s. A substantial part of the most recent expansion is accounted for by Indonesia — particularly from the newly opened forest resources in Kalimantan — whose log exports almost doubled within one year, approaching nearly 5 million cubic metres in 1970. Log exports from Malaysia, particularly Sabah, and the Philippines continued to grow at a somewhat slower pace, but their combined exports still represent more than two thirds of the region's total. Toward the end of the year markets in Japan showed some signs of weakening, which resulted in a reduction of stocks and reduced forward buying. Log imports by the Republic of Korea, Singapore and China (Taiwan) continued to grow, as these countries increased their processing of plywood and sawnwood for export.

Although data are still incomplete, there are indications that the hitherto brisk expansion of sawnwood and plywood exports slowed down in 1970. Exporters therefore increased their efforts to find new market outlets. Sawnwood exports from Malaysia increased at the same pace as before, but for the first time Japan became the largest buyer and exports to western Europe, previously the major outlet, declined correspondingly. The United States remained the largest buyer of plywood from the region, but western European markets became somewhat more attractive to exporting countries; Malaysia, for instance — a minor plywood exporter — doubled its plywood exports to the United Kingdom within a year.

Development plans and policies

Following the completion of Malaysia's first development plan (1966-70) the second Malaysia plan (1971-75) has now been introduced. New plans are also about to start in the Philippines and in Thai-

land, but there is little information available on them. The fourth plan of Pakistan (1970-75) may have to be modified because of the prevailing political situation in the country. Details of current development plans are shown in Table II-26.

The annual rate of growth of real GNP in Malaysia during the first plan period is estimated to have been 6.0 percent per year, as against the plan target of 5.6 percent. This success was mainly due to the good performance of agriculture, in particular the export sector. Rubber and rice output in 1965-67 grew more slowly than planned, but accelerated later, and the total agricultural production increased at an average rate of 8.0 percent a year, compared with the plan target of 5.5 percent. However, because of changes in world demand and prices for Malaysian export products, there were sharp fluctuations in the growth of agricultural GNP ranging from a 15 percent increase in 1969 to one of only 3 percent in 1970.

The rapid growth of GNP was achieved despite shortfalls in the investment programmes for both the public and private sectors (by about 7 and 20 percent respectively), due partly to the maturing of earlier investment in rubber and palm oil. This suggests that with the existing technoeconomic relations in the country a lower incremental capital output ratio may be possible than the 3.9 postulated in the first plan. An important reason for the shortfall in public sector investment was the shortage of qualified personnel for project implementation. In the private sector the shortfall can probably be explained by the relatively poor conditions in export markets during the early part of the plan. Although export prices improved in 1969, the change came too late to appreciably affect investment during 1970. There was a moderate shortfall also in the implementation of plans for the social sector (education, health, family planning, housing, etc.), with about 90 percent of the planned outlay actually spent.

Reliable employment figures are available only for West Malaysia, which accounts for about 85 percent of the labour force. During the plan period, 350 000 new jobs were created, only moderately less than the plan target of 377 000 new jobs. The shortfall in the target for reduction of unemployment was, however, much greater, because of the faster than expected growth of the labour force (2.9 percent a year, compared with a projected 2.7 percent). As a result unemployment, instead of falling from 6.5 to 5.2 percent of the labour force, as planned, increased to 8 percent (250 000 persons).

TABLE II-26. – FAR EAST: MAIN FEATURES OF CURRENT DEVELOPMENT PLANS

	Currency	Duration of plan	Scope [1]	Investment		Foreign exchange component of total investment	Share of agriculture		Planned growth rate of:						
									GNP	Agricultural production		Export earnings		Employment	
				Total	Public		Total investment	Public investment		Total	Cereals	Total	Agricultural	Total	Agricultural
				Million currency units		..... *Percent*			..... *Percent per year*						
Bhutan	B rupees	1966/67–1970/71	P S	...	212	...	...	21.0	...	...	...	...	...	...	...
China (Taiwan)	NT $	1969/72	C	156 460	48 687	43.0	11.8	43.6	7.0	4.4	3.4	7.2	...	3.6	1.2
India	Rupees	1969/70–1973/74	C	248 820	159 020	21.8	[2]15.3	[2]24.0	5.5	4.5	5.0	7.0	...	...	...
Indonesia	Rupiahs	1969/70–1973/74	C	1 420 000	1 059 000	...	26.0	35.0	5.0	...	...	...	...	...	...
Khmer Republic [3]	Riels	1968–72	C	32 000	12 240	...	25.0	...	7.0	4.5	...	...	...	...	...
Korea, Rep. of	Wons	1967–71	C	980 070	401 090	30.9	16.3	23.3	7.0	5.0	6.7	28.0	13.0	5.3	2.0
Laos	Kips	1969/70–1973/74	C	20 579	5 729	...	...	...	...	...	...	...	...	...	...
Malaysia	M $	1971–75	C	12 150	4 307	15.0	...	32.3	6.8	8.3	7.1	4.8	10.2	[4]3.2	[4]1.7
Nepal	N rupees	1970–75	C	2 930	2 280	65.0	32.9	26.1	4.0	...	3.0	...	...	...	...
Pakistan	P rupees	1970–75	C	75 000	45 000	23.0	19.0	31.0	6.5	5.3	6.7	8.5	...	2.0	2.2
Philippines	Pesos	1971–74	C	23 550	4 638	10.0	—	[5]16.7	5.6	6.2	6.2	8.5	...	4.0	...
Thailand	Bahts	1971/72–1975/76	C	100 000	69 000	...	...	...	7.0	...	...	7.0	...	...	...

NOTE: Where possible, data refer to net investment. In many cases, however, no distinction is made in the plan, and data may refer to gross investment or may include some element of recurring expenditure. The agricultural sector includes animal production, fisheries, forestry, irrigation, land reclamation, community development and agricultural extension.

[1] PS = public sector; C = comprehensive. – [2] Includes flood control expenditure. – [3] Formerly Cambodia. – [4] West Malaysia only. – [5] Water resource development only.

The shortfall in employment creation was due entirely to agriculture, the only sector where job creation fell short of target in absolute terms, by 60 000 jobs. This was mainly a reflection of substantial reductions in the work force on rubber estates, where labour productivity is rising rapidly. Another factor was the shortfall in land development programmes, particularly in West Malaysia.

Thailand's third five-year plan, due to start in October 1971, is still under preparation. The growth target for private consumption is reported to be 6.6 percent a year, that for government revenues 10 percent, and for public investment 8 percent. Expenditure on economic sectors is to fall from 36 to 34 percent while the outlay on social services is to increase. During the last plan (1966-70) GDP growth was targeted at 8.5 percent a year. Actual increase is estimated at 5.5 percent in 1967 rising sharply to 9 and 9.6 percent respectively in 1968 and 1969. The share of gross capital formation in GDP rose from 20.2 percent in 1965 to 26 percent in 1969, and as the savings ratio increased at a lower rate, from 18.9 percent in 1965 to 21 percent in 1969, the savings/investment gap, financed by capital imports, increased from 1.3 percent in GNP in 1965 to 4.4 percent in 1969.

In each of the new plans considerable emphasis is being placed on various aspects of social welfare, such as employment and income distribution. Indeed it may be said that in recent years, after the better part of two decades of planning experience in the region, a change in the planning philosophy appears to be taking place, consisting of a more critical assessment of the effects of GNP growth on the problem of mass poverty, and a greater interest in problems of social and economic equity.

Data are not available to measure the effect of recent planned development on income distribution. The available evidence suggests, however, that income inequalities in the region have not decreased, and in some cases may have increased. Rough estimates for Pakistan in 1959/60 indicated wide disparities between the highest and the lowest income groups.[21] The fourth plan of the country states that the number of landless labourers increased both relatively and absolutely during the third plan period (1965-70); that there was little gain in the real farm income per head for the smaller farmer; and that the inequalities between various income groups increased and became more evident.[22]

Elsewhere the situation is similar. A study on India referring to 1954-57 found that 25 percent of personal income in rural areas and 37 percent in urban areas were earned by the top tenth of the population, while the entire lower half earned 30 and 25 percent respectively.[23] Later, the fourth plan (1969-74) [24] stated that "available information does not indicate any trend toward reduction in the concentration of income and wealth." Ceylon may be the only country in the region where the data suggest that there was, at least up to 1963, no further concentration of income, but even there this appears to have been due mainly to a relative rise in the incomes of the upper middle class.[25] In the agricultural sector, too, income inequalities may well have increased recently because technological improvements have in most countries mainly improved the earnings of farmers who already had relatively ample resources, and because the limited progress in land reform has left the concentration of productive assets largely untouched.

Neither does the available information suggest that the planned growth in the region has brought about any improvement in the unemployment situation, which remains severe in many countries. In Ceylon, it is stated that out of the 3.25 million labour force 700 000 are unemployed,[26] with a particularly heavy incidence in younger age groups. Similarly, in Malaysia in 1965 nearly 6 percent of the labour force of 3.2 million was unemployed,[27] and, as already stated, this proportion seems to have risen since. In this country, too, the incidence was much higher in the younger age groups. In the Philippines, about 8 percent of the labour force was estimated to be unemployed in 1970, in addition to the numbers of underemployed.[28]

Aside from income distribution and employment, social welfare is also affected by plan outlay for items like housing and health, education and recreation. Largely on the basis of inferences from the historical experience of the developed countries, many planners traditionally take the view that in the early stages of development expenditure on social sectors (excluding education) is a luxury which can be postponed; and that economic growth not only increases income inequalities but is also stimulated by them.[29] It cannot be determined how much these views have affected the actual planning policies in the countries of the region. Planning documents almost invariably have included social justice and welfare as

[21] Pakistan. Planning Board. *The third five-year plan. 1965-70.* Karachi. 1965. p. 29.
[22] Pakistan. Planning Board. *The fourth five-year plan. 1970-75.* (Islamabad). 1970. p. 13.

[23] Ojha. P.D. & Bhatt. V.V. Pattern of income distribution in an underdeveloped economy: a case study of India. *American Economic Review.* 54: 711-720. 1964.
[24] India. Planning Commission. *Fourth five-year plan. 1969-74.* Delhi. 1969. p. 11.
[25] The "concentration coefficient" fell fractionally from 0.46 in 1953 to 0.45 in 1963. Central Bank of Ceylon. *Survey of Ceylon's consumer's finances.* Colombo. 1963. p. 66.
[26] Budget speech 1970/71.
[27] Malaysia. *First Malaysia plan. 1966-70.* Kuala Lumpur. 1965. p. 53.
[28] Philippines. *The Philippines four-year development plan. 1971-74.* Manila. p. 71.
[29] For instance, Mehbub Ul Haq. *The strategy of economic planning: a case study of Pakistan.* London. Oxford University Press. p. xv.

plan objectives.[30] However, these have largely remained unfulfilled, and under financial strains as a rule it has been the welfare objectives that are sacrificed.[31] Furthermore, the fiscal and licensing policies designed to help capital formation have in themselves tended to promote inequalities and led to a greater concentration of wealth.[32]

Policy makers have naturally been conscious of this, but social hardships and inequalities have been considered as the necessary price for growth at early stages. Only recently does there appear to have been any change in views and actual policies on these matters. The provision of social justice is increasingly being viewed as part of the general allocation problem of trade-off between goals: how much growth needs to be sacrificed if a given range of welfare measures is promoted? Moreover, it is being increasingly questioned whether growth is the function of capital alone, and whether the presumed positive correlation between saving (capital formation) and unequal income distribution really exists. Furthermore, social stability and growth are increasingly considered as complementary objectives, rather than competing ones. These changes are becoming evident not only in the stated objectives of recent plans, but also in policies.

In India the goal of greater social justice, including employment, is being sought through a number of institutional and policy measures proposed during 1969/70, including an increased degree of progression of overall taxation policies, changes in industrial licensing to neutralize bias against small business, and plans to implement land reforms more effectively. Following the nationalization of banks, credit policies have also been geared toward such an end. An improvement in the position of small farmers and small-scale family enterprises is planned through increasing the supply of credit, providing adequate inputs at reasonable prices, and encouraging subsidiary occupations. The Small Farmers' Development Agency and the Lead Banks Scheme [33] are expected to play a useful role in this respect. Renewed attention is also being paid to cooperative credit. A concerted attack on unemployment is the declared policy of the Government and a crash scheme for rural employment has recently been launched. However, as an expert committee appointed by the Planning Commission has concluded, a substantial amount of groundwork is needed to effectively tackle these problems.

Eradication of poverty and of inequalities between social classes and between rural and urban areas are given as the basic aims of the second Malaysia plan (1971-75).[34] Rural/urban inequalities are to be reduced through modernization of farming leading to increased labour productivity. There is also a substantial smallholder rubber replanting programme. Past experience indicates, however, that the employment generating potential of agriculture is low. Employment in agriculture in West Malaysia is therefore expected to increase only at the rate of 1.7 percent a year, as compared with 3.2 percent for overall employment, and the sector (which in 1970 accounted for 49 percent of total employment) to contribute 125 000 of the total targeted 495 000 new jobs during the plan period.

Greater social justice based on an incomes policy is one of the principal goals of the new development strategy of the fourth plan of Pakistan. To this effect, the plan includes fiscal and other policy measures to combat the concentration of economic power, and in 1970 an antimonopoly law was promulgated. The present situation in the country may, however, result in the plan's complete revision. The Philippines' four-year development plan (1971-74) is reported to aim at reducing unemployment from 7.7 percent in 1970 to 6 percent in 1974 through emphasis on labour-intensive projects that do not entail undue increase in costs or sacrifice of efficiency.

Forest policies

In the northern timber-deficit countries of the developing Far East, major efforts are being made to rapidly increase the rate of afforestation. China (Taiwan) and the Republic of Korea have set a target of about 400 000 hectares a year. At the same time, they are engaged in major watershed management projects covering vast areas in their uplands. The Republic of Korea has drawn up a ten-year programme for the coordinated development of four river basins, including irrigation, flood protection, and afforestation, at a total cost of some $300 million. Watershed management projects have also been initiated in China (Taiwan) with a view toward improvement of soil conditions for forestry in the uplands and protection of agriculture in the lowlands.

In the timber-surplus countries of developing southeast Asia, logging operations are being rapidly expanded. In Indonesia and Sarawak this is being done largely through granting concessions to private companies. In Indonesia, the area involved amounts

[30] For instance, one of the objectives of Pakistan's third five-year plan 1965-70 was "to make substantial progress towards achieving certain specific social objectives such as diminishing inequalities in the distribution of income, wealth and economic power, providing a measure of social security." (Pakistan. Planing Board. *The third five year plan, 1965-70* p. 4). India's third plan (1960-65) also had an intensive programme of social objectives. See particularly p. 9-19 of the plan.

[31] See for instance Mehbub Ul Haq, *op. cit.*, p. xv. and Pakistan. Planning Board. *Fourth five-year plan, 1970-75*. p. 9.

[32] India. Government. *Report of the Committee on Distribution of Income and Levels of Living*. Part 1, p. 3, also Pakistan. Planning Board. *The fourth five-year plan, 1970-75*. p. 15-16.

[33] Under this scheme mobile units of commercial banks go to small villages in order to mobilize savings and distribute loans.

[34] *Second Malaysia plan*. Kuala Lumpur. 1971. p. 4-6.

to no less than 10 million hectares, and timber production is expected to rise from half a million cubic metres in 1969 to 5 million by 1973. Concessions for rain-forest exploitation are being granted mainly to Japanese and United States companies. In most cases they not only specify the amount and type of fellings, but also include provisions on the construction of forest roads, houses for workers, and the establishment of forest industries, in particular sawmills and plywood and veneer mills. Forest inventories are being carried out by private firms under the supervision of the national forest service.

Malaysia has started preparation of an overall land classification and development plan. It provides for a considerable reduction of the forest area which will ultimately be confined to the hill reserves. The Khmer Republic and Laos have issued new forest legislation which aims at increasing productivity, and makes provisions for the coordination of forest and forest industries development.

Regional economic cooperation

The factors which so far have limited the progress of economic cooperation in the region are well known. They include the different ethnic, cultural and political history of the countries, great inequalities of economic and political power among them, and different political alignments. In their agricultural production, many of the countries are competitors rather than potential cooperators, and national policies of self-sufficiency and import substitution in food and other commodities have recently further reduced the opportunities of intraregional trade.

However, some opposite pressures are emerging which tend to work for increased economic cooperation. Industrialization behind high tariff walls has in many instances led to the creation of manufacturing and processing plants which remain underutilized and hence high-cost, and widening of markets through regional or subregional cooperation is increasingly seen as a possible means of easing the problem. This is particularly true for countries which have reached a relatively more advanced stage of manufacturing, when economies of scale become important. Other factors working in the same direction include the steady increase in the volume and value of trade among developing countries of the region, which by their very momentum have tended to encourage closer economic contacts. The fall in food exports resulting from increasing national self-sufficiency has induced many countries in the region to embark on what might be seen as efforts toward regional supply management through regional planning and action to restrain production, build buffer stocks, and divert surpluses to other uses. This has led among other things to the proposal for the establishment of an Asian rice community. Moreover, the increase in exports of manufactured products from several countries of the region suggests the gradual emergence of economic complementarity, and hence improved bases for regional cooperation, both through vertical integration in the production of goods, with different countries specializing in different stages of processing, and through agreed specialization on the basis of regional or subregional plans. Finally, the unfavourable market trends and prospects for primary agricultural products are kindling concerted action (for example price agreements, export quotas, packing and processing standardization) for commodities exported by several countries, in an effort to improve the exporters' bargaining position against the -eco nomically more powerful buyers.

Although the economic bases for regional cooperation may thus be improving, the other obstacles mentioned remain, and need to be taken account of in the search for suitable methods and forms of economic cooperation. Experience over the past few years suggests that a fruitful approach would be through limited and specific forms of integration, for instance in the form of cooperative arrangements on a commodity or project basis, or through subregional groupings of countries with close political affinities. The framework for these types of cooperation is being institutionalized in the Council of Ministers on Asian Economic Cooperation, backed by strong technical support from the Economic Commission for Asia and the Far East (ECAFE).

The first example of commodity-based cooperation was the Asian Coconut Community established in 1969. This initially received widespread support throughout the region but nevertheless experienced some early difficulties in starting specific projects. Subsequently, in March 1970, a Pepper Community was set up by the governments of India, Indonesia and Malaysia, and in April 1970 a resolution was adopted at ECAFE's twenty-sixth session calling upon member governments to initiate regular intergovernmental consultations to review rice trade, prices and problems pending the establishment of an Asian rice community. Studies have also been instituted for the establishment of a rubber community and a tea community basically modelled on the charter of the Asian Coconut Community.

An early example of cooperation on a project basis is the Mekong Development project. Progress has suffered from the disturbed conditions in the area, and work in the past year was devoted to the drawing up of an indicative basin plan, an overall framework for the development of the economic potential of the basin up to the year 2000. A more recent example of cooperation on a project basis is the proposed development of the Salween

river basin on the frontier between Burma and Thailand.

Somewhat more comprehensive forms of cooperation may be possible among small groups of countries within the region which, for various reasons, have wider common interests and political affinities. An example of such a subregional grouping is the establishment of the Association of South East Asian Nations (ASEAN) which includes Indonesia, Malaysia, the Philippines, Singapore and Thailand. This association is now studying the feasibility of measures for partial or complete economic integration, while member countries are examining various possible fields for joint action and the forms of such cooperation.

The importance of trade expansion among countries of the region in general, and the need for payments arrangements to support it, were stressed by the Council of Ministers for Asian Economic Cooperation at its meeting in December 1970 in Kabul. To further such action it was decided to establish preparatory intergovernmental committees for the examination and negotiation of specific proposals for an Asian clearing union, a regional central bank and a regional trade expansion programme. Such a payments union (being promoted also by the Asian Development Centre in Manila and its parent body, the Asian Parliamentary Union), although not capable of trade stimulation to the extent of a common market, would facilitate trade, increase liquidity, and ease the flow of funds and capital in the countries concerned by allowing financial settlement in their own currencies.

JAPAN

The Japanese GNP grew in 1970 by an estimated 12 percent in real terms, slightly less than in the preceding three years, but well in line with the trend over the past decade. For 1971 an official forecast of 10.1 percent real GNP growth was issued early in the year but in face of mounting evidence of economic slowdown the forecast was reduced in October to about 5 percent. In the longer run, the economic and social development plan for 1970-75, adopted in April 1970, envisages an average growth rate for the six-year period of 10.6 percent in real terms.

In contrast to the rapid growth of the rest of the economy, agricultural production in Japan showed no increase in 1970. In the main this reflects the smaller production of rice, wheat and oilseeds. The rice crop was reduced to 16.5 million tons (paddy), as compared to an annual average of 18.6 million tons in the three preceding years, reflecting mainly the Government's policies to induce farmers to shift to other crops or to set their paddy lands aside against compensation (see below). Wheat production declined by 37 percent to 474 000 tons, largely because of the conversion of wheat land to more profitable crops. Oilseed production declined mainly because imported oilseeds are cheaper.

In response to rapidly rising demand, livestock production has increased steadily, principally through the medium of large-scale stock raising. Milk production continued to increase and reached 4.82 million tons in 1970, a 6 percent increase over the 1969 level, and is forecast at 5 million tons in 1971. The number of beef cattle also increased, reflecting government and industry interest in expanding domestic beef production, and output of beef and veal rose to an estimated 230 000 tons in 1970. Pork production recovered in the latter half of the year.

Preliminary indications suggest that the same trends in agricultural production continued in 1971. Overall output may actually have decreased somewhat, largely because of a further steep fall in rice production (August estimates put the crop at 14.5 million tons of paddy, and subsequent indications are that the crop may be even smaller) and further decreases in output of wheat, barley, potatoes and oilseeds. Meat production, on the other hand, rose again substantially, as did the output of milk and eggs.

These changes in output are a reflection of major shifts taking place in the pattern of demand for foodstuffs as a consequence of rapid income growth — a fast increase in consumption of livestock products and of fruit and vegetables, and reduced demand for rice.[35] Also, the pattern of the country's agricultural imports is being affected. Meat imports have been rising steadily, to over 200 000 tons in 1969, mutton and lamb accounting for more than half. However, they fell by nearly a quarter in 1970, in response to import restrictions designed to encourage domestic production. Pork imports were down by 60 percent to 17 000 tons, and mutton and lamb fell less steeply to 111 000 tons; only beef showed a small increase, to 23 000 tons. The 15 percent increase in cereal imports in 1970, to 15.6 million tons, was mainly a reflection of a continued increase (18 percent) in imports of feedgrains, to over 10 million tons, and a smaller increase for wheat, to 4.7 million tons. Rice imports continued to fall sharply, to only 19 000 tons. On the other hand, rice exports expanded by almost 300 000 to nearly 620 000 tons. All these shipments were on concessional terms, mainly to the Republic of Korea, Indonesia and Pakistan, and constituted a part of the Government's efforts to reduce heavy surplus stocks (see below).

[35] According to a recent report by the Ministry of Agriculture and Forestry, per caput annual rice consumption in Japan has dropped to 96.9 kilogrammes.

Japan maintains its position as the leading fishery country of the world, and in value terms the country's production and exports are far above the levels attained by any other country. Catches in 1970 were about 9 percent larger than in 1969, and value increased even more. In the longer run, Japan's leadership in fisheries will be contingent on the success its fishery industry has in meeting demand through discovery of additional resources, on the availability of labour, and on rationalizing production and distribution to maintain the profitability of fishery enterprises. While Japanese fish production and exports are not likely to change substantially in the 1970s, the country's imports, which in value terms are the third largest in the world, are expected to continue to increase in line with growing demand.

The strong growth in industrial processing and consumption of forest products in Japan in 1970 was not accompanied by a corresponding rise in industrial roundwood removals, the latter being limited by the virtually full utilization of all currently accessible forests. The output of all forest products rose, however, as the imports of roundwood and chips increased substantially. Production of pulp, paper and paperboard expanded at a rate well above the world average. In order to increase the domestic raw material base, a new afforestation target of 100 000 hectares a year has been set. The multiple calls made on Japan's forests — including soil and water resources, protection and recreation — tend to limit output of industrial wood. The roundwood self-sufficiency targets are therefore being gradually scaled down (in 1970 less than half the raw material used was domestic) and new measures are being taken to increase the flow of forest products from abroad, including more highly processed products, and to establish joint forest industries in timber-rich countries — especially in southeast Asia — and pulpwood plantations in southeast Asia and Brazil. In the meantime, strong research efforts are being made to develop "synthetic" paper, and small quantities are already being produced for commercial use.

Principal problems and policies

The principal agricultural problems of Japan remain those which were discussed in the 1970 issue of this report — the continuance of sizable rice surpluses and structural defects. Because the sector consists mainly of small-scale family farms it is difficult to introduce a technology which can satisfy the growing and more varied demand for foodstuffs, and meet the income expectations for the rural population without extensive transfer payments from other sectors.

Due to three successive annual rice crops of over 18 million tons (paddy) in 1967-69 resulting from improved technology, high support prices and good weather, and a simultaneous decline in consumption, government stocks of some 12 million tons had accumulated by October 1970. Measures taken recently to limit these stocks through the diversion of rice land to other uses, the introduction of a limited "free" market system for rice, the freezing of the 1969 producer price at the 1968 level, and the allocation of rice for feed, have not proved effective enough. In 1970 the Government therefore introduced major new measures in the form of inducements to rice farmers to switch to other crops or types of farming, or simply to leave idle, about 11 percent of the existing paddy area. Despite these drastic measures the 1970 rice harvest is estimated to have been about 1 million tons in excess of national consumption. That production did not fall more is explained by the lack of adequate opportunities for crop diversification. Some observers suggest, however, that the subsidy for nonproduction — $970 per hectare — together with the continuing expansion of nonfarm employment opportunities may in the end make the policy successful. This is becoming increasingly important in view of the growing difficulties of disposing of surplus rice stocks in the face of declining import demand in deficit countries and growing exportable supplies in the traditional exporting countries of the region. To bring supply and demand into proper balance and to deal with immediate difficulties, the Government therefore announced plans to cut down the rice output by 2 to 3 million tons in the fiscal year 1971 (April 1971 to March 1972) by further changes in the price support policy, by letting the farmers sell more on the free market, and other measures. These policies appear to have been largely successful, and production in 1971 is thus likely to be less than domestic consumption. The Government is therefore hopeful that surplus stocks can be eliminated within the next four years.

The seriousness of the structural problem of Japanese agriculture is indicated by the fact that the sector accounts for merely 7 percent of the country's national income, while as much as 18 percent of its working population is engaged in agriculture. Because of the small size of the average farm, land productivity in Japan is two to four times as high as in other advanced nations, but labour productivity is as low as one half to a quarter of their level. The low relative productivity of labour in agriculture and the ability of the rest of the economy to make compensating transfer payments explain the high prices of Japan's agricultural products by international standards. A drastic revision of the farm land law (1952) was approved in May 1970 to clear the way for the creation of large-scale farms, and even a total

repeal of the law is now being suggested. On the other hand, fears are being expressed that such a policy might, while solving some problems, create a new problem of unemployment. The Government estimates [36] that a new radical farm policy, if executed on schedule, will result in some 100 000 farmers becoming unemployed each year, the majority of them middle-aged or elderly people difficult to relocate in other occupations. Recognizing the problem, the Government is reported to have started encouraging redevelopment of major rural communities into primary and secondary industrial centres.

MAINLAND CHINA [37]

Mainland China's 1970 grain harvest (including potatoes and sweet potatoes in grain equivalent) has been estimated by FAO at around 230 million tons, as compared to some 220 million tons in 1969.[38] The production of rice (paddy) is estimated at 100 million tons in 1970, about 5 percent more than in 1969, and that of wheat at a record 30 million tons, as against 28.5 million tons the previous year. Experiments in triple cropping are reportedly being undertaken. Campaigns are also reported to have been started to extend the acreage under dryland crops, and in 1970 there were reports of a 20 percent increase in the area planted to sweet potatoes, maize, sorghum, beans and other dryland crops. Fallow lands were also being put to use for the cultivation of maize, wheat, barley, millet and sweet potatoes. The use of agricultural inputs, especially chemical fertilizers, irrigation, machinery and improved seeds, is reported to have reached a record level in 1970.

Meat production does not seem to have been very satisfactory. Despite the fact that collective farms and the remaining private farms have been given state help to build up herds, there is doubt whether the pig herd, so important for the agricultural trade balance, has recovered to the level which existed prior to the cultural revolution.

Mainland China's foreign trade in 1970 was estimated at $4 300 million as compared to $3 870 million in 1969, an increase of about 11 percent. Grain imports, consisting almost exclusively of wheat, were expected to decline from the high 1969/70 level, but still remain substantial. The country has in recent years been the largest market for Australian exports of wheat. The other major supplier is Canada, with whom a large delivery contract (2.5 million tons) has been signed for 1970/71. Raw jute and cotton are being purchased from Pakistan. In 1969/70 imports rose steeply to 435 000 bales of jute (77 000 tons) but were expected to return to normal levels in the current season (1970/71). On the export side, mainland China has been having difficulties in disposing of its exportable surpluses [39] of rice — for which the markets in general are contracting — and soybeans. Under the 1970 China-Ceylon Loan Agreement, mainland China offered an interest-free loan of 22 million yuan ($8.9 million), payable over 10 years from 1972, for the purchase of 100 000 tons of rice. The exchange of rice for Ceylonese rubber also continues. According to the new agreement signed in January 1971, Ceylon will buy 200 000 tons of rice, at £35 a ton (£1 under world price), in exchange for 41 000 tons of rubber.

[36] Industrial review of Japan 1971. *Japan Economic Journal*. December 1970.

[37] In the absence of any published official statistics on the mainland Chinese economy, this section is based on information derived from a number of sources, including press reports, magazine articles, economic reviews, digests, etc.

[38] The western economic analysts in Hong Kong estimate the grain production in 1970 at 210 million tons. Recently, Chou En-Lai, the Chinese Prime Minister, claimed that China's total grain production in 1970 reached a record 240 million tons. The FAO method of estimating cereal production in mainland China is explained in *The state of food and agriculture 1968*, p. 14.

[39] Mainland China had since the early 1960s reappeared as a major rice exporter, mainly through the substitution of wheat for rice in the internal market.

Near East

The rate of economic growth has been sustained in many countries of the Near East, despite political tensions and a slackening in the rate of growth of oil production in some countries. In Iran the growth of GNP in 1970 exceeded the target of 9 percent set in the fourth development plan, while in Israel a growth rate of 8.5 percent has been maintained. In Lebanon the rate was 7.5 percent, compared to 6.5 percent in 1969. In Syria, GDP grew by about 4.6 percent, considerably less than the second five-year plan target rate of 7 percent. Growth of GDP in Turkey and Cyprus declined, in the former from 6.4 percent in 1969 to 5.6 percent in 1970, and in the latter from 10 percent to 4 percent.

Except in the oil-producing countries agriculture still dominates the economies of the Near East. Since weather conditions were unfavourable in much of the region, output in the majority of the countries remained virtually unchanged or fell. This was a main reason for the slowdown of economic growth in Cyprus, where there was only a slight increase in farm production despite a large increase in expendi-

ture on inputs, and will no doubt have had a similar effect on a number of other countries for which GDP data for 1970 were not available.

Since the agricultural sector has lagged behind other sectors throughout the region, new policies continue to give priority to improving its performance. In Iran, with a view toward increased income and productivity, small farms with low yields are being combined into more efficient units, and the establishment of a number of farming corporations covering more than 25 000 hectares has been proposed. In Turkey, the programme for high-yielding varieties of wheat is being expanded still further. In Syria, great stress is being laid on expansion of irrigation facilities; hence in the third five-year plan the Euphrates project constitutes the major investment. In the United Arab Republic, as scope for expansion of the agricultural area is very limited, attention is directed to greater intensification of production through improvement of soil quality, drainage, and general measures to raise agricultural productivity.

Agricultural production

In spite of the serious efforts that the various countries of the region are making to promote a steady development of their agriculture, particularly through the expansion of the irrigated area, 1970 showed once more the high vulnerability of the region's agricultural production to changes in weather conditions. The drought of the 1969/70 winter and the unseasonable distribution of rains in practically the whole Near East area led to a significant drop in output of cereals and all rainfed crops in general, only partially offset by the larger output in irrigated areas. Thus in 1970 the indices of both total agricultural production and food production are estimated to have remained virtually unchanged. With a population growing at an average rate of 2.9 percent per year the decrease in per caput food production for the region was of the order of 3 percent.

To keep consumer prices of basic foodstuffs at reasonable levels the 1970 production setback made it necessary for a number of countries to increase imports of agricultural products, notably wheat, barley and meat. The pressure on food prices continued in the first part of 1971 and there are already indications that especially imports of cereals into the region will rise further in the course of the year. With the exception of Cyprus, the Sudan, Turkey and the Yemen Arab Republic, where the index of total agricultural production rose by 2 percent or more, production in all other countries was either stationary or registered substantial declines (see Table II-27).

TABLE II-27. – NEAR EAST: INDICES OF AGRICULTURAL PRODUCTION

	1966	1967	1968	1969	1970 (preliminary)	Change 1969 to 1970	Per caput agricultural production in 1970
	1952-56 average = 100					*Percent*	*1952-56 average = 100*
PRODUCTION IN SELECTED COUNTRIES (all products)							
NEAR EAST IN AFRICA	150	154	155	171	173	+ 1	114
Libya	189	190	213	194	192	— 1	110
Sudan, The	165	190	172	205	209	+ 2	133
United Arab Republic	146	142	152	164	165	+ 1	112
NEAR EAST IN ASIA	146	151	158	159	157	— 1	102
Afghanistan	123	132	136	140	136	— 3	99
Cyprus	170	212	213	238	243	+ 2	198
Iran	155	156	179	173	170	— 2	108
Iraq	135	143	167	165	150	— 9	89
Jordan	134	151	122	138	110	— 21	68
Lebanon	191	211	208	190	192	+ 1	120
Saudi Arabia	146	147	145	150	152	+ 1	93
Syria	126	151	145	155	138	— 11	87
Turkey	157	160	168	166	171	+ 3	112
Yemen Arab Republic	97	97	94	94	100	+ 6	70
Yemen, People's Dem. Rep. of [1]	110	111	102	140	115	— 18	83
ISRAEL	257	299	321	324	329	+ 2	194
PRODUCTION IN DEVELOPING COUNTRIES [2]							
Total							
All products	148	153	159	163	163	—	
Food only	145	150	155	159	159	—	
Per caput							
All products	108	109	110	110	107	— 3	
Food only	106	107	108	107	104	— 3	
REGIONAL PRODUCTION [3]							
Total							
All products	150	155	161	165	165	—	
Food only	147	152	158	161	161	—	
Per caput							
All products	109	110	111	111	108	— 3	
Food only	107	108	109	109	106	— 3	

[1] Formerly Southern Yemen. – [2] Excluding Israel. – [3] Including Israel.

Among the major commodities, wheat output in 1970 fell by about 7 percent to an estimated 19.8 million tons, mainly because of significant reductions in Afghanistan, Iraq, Jordan, Syria and Turkey, where the impact of the dry season was particularly marked. The lack of adequate rainfall, however, was mostly felt by barley which is grown almost entirely in rainfed areas and whose output fell by more than 20 percent, from 7.6 to 6.0 million tons. Production of maize, which is mostly concentrated in the United Arab Republic, Turkey and Afghanistan, did not change from the previous year's level of nearly 4.3 million tons. The production of rice, which is a major crop in both

the United Arab Republic and Iran and is of increasing importance in Afghanistan, Iraq and Turkey, was down slightly but the total remained only 3 percent below the 1968 record of 4.6 million tons (paddy).

Output of cotton, the most important export crop of the region, declined by 2 percent mainly because of the deliberate reduction in area which was shifted to horticultural production in the United Arab Republic and Turkey. Only Syria, among the major cotton-producing countries of the region, registered a production increase, largely because of the higher yield of irrigated cotton.

Total production of the various horticultural crops, which are a major export item in several countries, rose only marginally in 1970. There were good harvests of citrus fruit and dried fruits, offsetting declines in the production of other horticultural crops which suffered from the untimely rains and irregular temperatures. Regional livestock production was affected by the unfavourable weather conditions and, in line with the very slow rate of growth of the past, increased only fractionally in 1970.

The fall in agricultural production in Afghanistan reflects mainly the lack of adequate rainfall during the 1969/70 winter and the following growing season, which hindered efforts to increase the irrigated area under high-yielding wheat and led to a reduction in the rainfed areas sown to wheat, barley and maize. As a result wheat output dropped by about 7 percent and there were also declines in the production of other grains. The cereal shortage brought about a relatively sharp increase in food prices and an increase in agricultural imports.

A reduced cereal crop and almost unchanged production of most other major crops and livestock products were responsible for the fall in agricultural production also in Iran, Iraq, Jordan, Lebanon and Syria. Poor pasture conditions and a substantial rise in feedgrain prices in Jordan resulted in unusually high slaughter of animals. By contrast weather was favourable for livestock in Lebanon where production of red meat increased slightly without any depletion in animal stocks.

The small decrease in agricultural production in Iran reflected mainly lower outputs of wheat, rice and cotton which were only partly offset by a bumper output of dried fruit and a record sugar-beet crop. The country continued to be short in dairy and meat products. Meat in particular, because of very strong domestic demand, is becoming an increasing burden on the balance of trade of the country. A step toward remedying this situation was taken by the Agricultural Development Bank which during 1970 more than doubled its loans for livestock and animal husbandry projects for a total amount of around $180 million.

The moderate increase in Turkey's agricultural production in 1970 was mainly due to increased vegetable oil and dried fruit production, which easily balanced the nearly 7 percent drop in the cereal harvest and the unchanged output of cotton. Besides bad weather other factors such as institutional deficiencies in the distribution of seeds, fertilizers and credit accounted for the smaller harvests of both wheat and barley. The very large production of vegetable oil is explained by the fact that 1970 was an " on " year for olives and by the record crop of about 380 000 tons of sunflowerseed, the area under which has more than doubled during the past five years.

The practically stationary agricultural output in the United Arab Republic was the combined result of increases in the production of wheat and sugar and a decline in that of cotton. The latter fell by nearly 6 percent because of reduced area allocations and adverse weather in the summer of 1970 which lowered yields. The policy to divert part of the area under cotton to permit expansion of other crops, especially vegetables, was continued in 1971. Despite the slightly smaller area, the production of rice virtually equalled the previous year's record of about 2.6 million tons (paddy). The steady expansion in the production of citrus fruit, which in recent years has become an important export product for the country, was temporarily halted in 1970 because of lower yields.

Preliminary indications for 1971 suggest somewhat better production results in the region as a whole, perhaps of the order of 2 to 3 percent, although it is still doubtful whether the increase in food output per head will match the population growth. Moreover, differences in agricultural production between countries tend to be particularly large as a result of the heavy impact of widely varying weather conditions. Thus a substantial recovery in output is estimated to have taken place in 1971 in Libya, Jordan, Lebanon, Syria and the People's Democratic Republic of Yemen, while notable setbacks took place in the eastern part of the region, especially in Afghanistan, Iran and Iraq, owing to inadequate rainfall for the second, and in some cases the third, successive year. Continued progress, based on further improvements in technology, appears to have been achieved in the United Arab Republic and Turkey.

Among the major commodities, there was an overall recovery in output of all cereals except rice, the production of which is estimated to have remained at the high level of the previous year. Wheat production is likely to have risen by about 5 percent, or 1 million tons, because of increases by one fifth in Turkey, and about 10 percent in the United Arab Republic, under the impact of expanded use of

high-yielding varieties and more favourable weather than in 1970. These increases more than offset the serious setbacks in Afghanistan, Iran, and particularly Iraq where the wheat crop is estimated to be down by about half. The situation for barley is similar, with a large increase in Turkey more than offsetting smaller crops in Iran and Iraq. In the three drought-stricken countries, particularly Afghanistan, the reduced grain crops are having serious effects on supplies and on import requirements. The livestock production of these countries in 1971 will probably also be adversely affected. The production of cotton, the principal nonfood crop of the region, is likely to have recovered in Turkey and the United Arab Republic, but output in the Sudan may show little change.

High-yielding varieties of cereals

In countries where the adoption of high-yielding varieties of cereals has been making headway, measures were taken in 1970 to remove some of the constraints to their wider introduction. In Afghanistan, under the wheat campaign, there has been a substantial increase in imports of fertilizers which are sold to farmers at a subsidy of 30 percent. In Iran, about 2 500 tons of Bozostaya No. 1 wheat seed were imported from the U.S.S.R., and 1 500 tons of Mexican Inya 66 from Denmark, in 1970/71. Under the "impact programme" for wheat, about 350 000 hectares are expected to be sown to improved varieties in 1971/72, compared with 100 000 hectares actually sown in 1970/71. The farmers are given production loans for the purchase of seed, chemicals for seed treatment, and fertilizers, to be repaid after harvest. A second fertilizer factory has been established at Shahpur in order to increase supply. A major problem is fertilizer distribution to farmers, which has been hampered by insufficient storage space and lack of transport and credit facilities. A Fertilizer High Council has been set up to deal with all matters pertaining to fertilizers.

In Turkey's high-yielding wheat programmes, Sonora 64, which is susceptible to rust, has been replaced by Lerma Rojo and Penjamo, and experiments are being conducted on some very promising Italian strains suited to the warm Mediterranean coast. The dryland wheat programme promoting utilization of the Russian variety Bozostaya has been meeting with reasonable success. The 1970/71 target for area under high-yielding varieties is 1 million hectares. Apart from fertilizers, increased mechanization is a vital aspect of the programmes: suitable soil preparation equipment and deep furrow drills, in combination with proper rotation practices, have to be introduced on an expanded scale. Imports of agricultural machinery have been allowed, while efforts are being made to encourage the manufacture of machinery and implements in the country. However, mechanization is not easy to implement due to fragmentation of farms and difficulties in financing purchases of new equipment by farmers.

Giza 155 now covers 77 percent of the total area under wheat in the United Arab Republic, compared with 30 percent in 1969. Nine other dwarf varieties are being tested for rust tolerance. They are highly responsive to fertilizer and irrigation and also resist lodging better than Giza 155, and their yields are expected to be 15 percent higher. It is envisaged that before 1974 the entire wheat area will be sown to Giza 155 and other high-yielding varieties.

Trade in agricultural products

After three years of apparent stagnation the volume of agricultural exports from the developing countries of the Near East is estimated to have increased by over 10 percent in 1970. Because of lower prices, however, export earnings rose by only 3 percent (Table II-28), roughly equal to the rate of growth of the past decade. The substantial increase in the volume of agricultural exports was mainly the result of larger shipments of cotton from all major exporting countries, most of which had excellent cotton harvests in 1969.

TABLE II-28. – NEAR EAST:[1] INDICES OF VALUE OF EXPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	Share of total agricultural exports in 1970	1966	1967	1968	1969	1970[2]	Change 1969 to 1970
	Percent	*1957-59 average = 100*					*Percent*
AGRICULTURAL PRODUCTS	99	127	123	129	135	138	+ 3
Food and feedstuffs	31	145	149	170	193	168	+ 13
Rice	(6)	185	252	377	461	286	— 38
Fruit	(9)	161	174	183	204	199	— 2
Vegetables	(4)	165	191	154	177	222	+ 25
Beverages and tobacco	8	97	114	95	87	83	— 4
Tobacco	(6)	99	112	90	81	74	— 8
Raw materials	60	125	114	119	120	137	+ 14
Cotton	(58)	128	117	123	124	142	+ 15
FISHERY PRODUCTS	1	161	183	151	157	106	— 32
FOREST PRODUCTS	—	295	191	148	197	191	— 3
Agricultural, fishery and forest products	100	127	124	129	135	138	+ 2

[1] Excluding Israel. – [2] Preliminary estimates.

Owing to stiff competition in foreign markets, the export prices of all major agricultural commodities — including cotton, rice, oranges, tobacco and raisins — were significantly lower than in the previous year, and the fall was particularly marked for rice and tobacco, by more than 25 and 10 percent respectively.

In spite of an 8 percent drop in price, the 25 percent expansion in the volume of cotton exports raised earnings by some 15 percent. The largest increase in value, of nearly 50 percent, was registered by Turkey which in 1970 for the first time ranked first with respect to volume shipped (about 320 000 tons). Because of the lower price of Turkish cotton, however, it was third, after the United Arab Republic and the Sudan, in terms of export earnings. Record sales of cotton were also registered by the Sudan, which in 1970 nationalized the marketing of this vital source of foreign exchange for the country. Exports from Syria rose by about 10 percent in volume but only fractionally in value, while increases were registered by both Iran and the United Arab Republic in volume and value of cotton sales.

With the notable exception of Turkey, all other major cotton exporting countries in the region have established special trade and barter arrangements with the eastern European countries and the U.S.S.R., which have provided a ready and expanding market for Near Eastern cotton. Notwithstanding this, most exporting countries are making efforts to diversify the destination of their cotton shipments as much as possible, and are giving attention to opening new markets in developing countries.

After the record sales of 1969, exports of rice from the United Arab Republic, the only important rice exporter in the Near East, declined by 15 percent in volume to an estimated 654 000 tons and, because of the sharp fall in price, by more than one third in value. The country is reported to have reduced its export target in 1970/71 not only in view of increasing competition in world markets but also to meet rising domestic demand.

The fruit trade of the developing countries of the region was adversely affected by depressed prices and smaller shipments, principally of oranges and raisins, and earnings fell slightly. For the second consecutive year the United Arab Republic was able to export around 100 000 tons of citrus fruit (mainly oranges) and thus emerged as one of the most important fruit exporters of the region. This is a remarkable achievement considering that until a few years ago exports of citrus fruit from this country were negligible.

For the third year in succession the value of tobacco exports declined, mainly due to lower prices. Turkey, which accounts for about 90 percent of Near East exports of manufactured tobacco, continued to face strong competition from other exporters.

On the import side, reasonably consistent data for 1970 were available only for cereals at the time of writing. For these as well as for many other food products, first estimates indicate that larger imports were probably necessitated by rising consumer prices in all countries where 1970 agricultural production was adversely affected by drought. Cereal imports are estimated to have been up by about one quarter, after a decline of some 30 percent in 1969, following an improvement in production in a number of countries. At 4.5 million tons, the total still remained below the level of the years 1965-68 and was almost 10 percent less than in the peak year 1968. There was a large — 50 percent — increase in imports of wheat, which account for some two thirds of the total. Purchases by all major importing countries were up sharply with the exception of those of the United Arab Republic, where they declined for the third successive year to a level of about half that of the peak in 1967. Large increases were registered in Syria, where wheat imports exceeded 400 000 tons, about ten times the level of 1969 and 50 percent above those in the previous peak year, 1968. Lebanese imports were also larger — by some 40 percent to a new record of 363 000 tons — as were those of Cyprus and Iraq. Both Lebanon and Cyprus also imported larger amounts of barley, and Lebanon took more maize as well, as did the United Arab Republic.

Development planning

Syria and the People's Democratic Republic of Yemen initiated new plans in 1971 (Table II-29). Revisions have been made in the plan of the Sudan and changes in planning organization are being implemented in Libya.

Syria completed its second five-year development plan (1966-70) in 1970, and in 1971 launched its third plan (1971-75). The second plan aimed at a net annual increase of 6 percent in the value of agricultural production and at the creation of employment in agriculture for 95 000 workers. Production targets were generally met or exceeded in the livestock sector, but for agricultural production as a whole the increase, at a rate of 2.6 percent a year in 1965-68,[40] remained well below the target rate. Agricultural employment, however, increased substantially.

The large gap between actual output and the production targets of the second plan reflects a serious shortfall in investment, and a number of

[40] Rates of change calculated over short periods are, however, much influenced by the large fluctuations of output typical for the countries of the region.

TABLE II-29. – NEAR EAST: MAIN FEATURES OF CURRENT DEVELOPMENT PLANS

	Currency	Duration of plan	Scope [1]	Investment		Foreign exchange component of total investment	Share of agriculture		Planned growth rate of:						
									GNP	Agricultural production		Export earnings		Employment	
				Total	Public		Total investment	Public investment		Total	Cereals	Total	Agricultural	Total	Agricultural
				Million currency units		..... *Percent*			..... *Percent per year*						
Afghanistan . .	Afghanis	1969–71	PS	...	17 000	...	...	28.0	4.3	3.5	...	...	...	...	...
Cyprus	£ C	1967–71	C	186	66.6	...	12.9	29.0	6.8	8.5	...	8.9	14.1	1.6	0.1
Iran	Ir rials	1968/69–1972/73	C	810 000	443 000	...	14.0	17.0	9.0	5.0	5.7	14.7	...	2.7	1.3
Iraq	I dinars	1969/70–1974/75	C	1 144	859	...	19.7	24.5	7.1	7.0	...	2.7	...	4.5	4.1
Saudi Arabia .	S riyals	1970/71–1974/75	PS	41 313	...	...	3.6	...	[2]9.8	4.9	5.7	...	...	3.4	1.0
Sudan, The . .	Sd pounds	1970/71–1974/75	C	370	200	95.0	27.9	37.2	[2]7.6	10.0	11.4	10.6	10.6	2.0	1.6
Syria	S pounds	1971–75	C	8 000	6 450	...	31.5	39.0	8.2	5.1	...	6.5	...	...	2.8
Turkey	T liras	1968–72	C	111 500	58 600	...	15.2	...	7.0	4.4	4.4	5.3	4.5	3.3	0.7
Yemen, People's Dem. Rep. of	Y dinars	1971/72–1973/74	C	41	38	47.2	25.8	27.5	...	6.0	3.3	4.0	...	3.3–3.9	3.3

NOTE: Where possible, data refer to net investment. In many cases, however, no distinction is made in the plan, and data may refer to gross investment or may include some elements of recurrent expenditure. The agricultural sector includes animal production, fisheries, forestry, irrigation, land reclamation, community development and agricultural extension.

[1] PS = public sector: C = comprehensive. – [2] GDP.

difficulties encountered in implementing the envisaged measures and policies for production growth. Planned soil and topographical surveys, for example, were not undertaken, and the amounts of chemical fertilizers and pesticides used were well below target levels (Table II-30). Other explanatory factors are reported to include the failure to utilize agricultural credit to its best advantage, high level of soil salinity and lack of drainage facilities in irrigated areas, failure to make up shortages in extension services and cooperatives, instability of agricultural prices, misuse of irrigation water, absence of proper crop rotations and shortage of quality seeds.

Plan implementation is also reported to have suffered due to overcentralized decision-making within the Ministry of Agriculture, lack of coordination between the various implementing agencies, slow release of budgeted appropriations, and the absence of government decrees in support of the agricultural production targets. Difficulties were also encountered in the implementation of the plan policies, particularly those related to organization and management, agricultural prices, agricultural development financing, agricultural structural transformation and agricultural research.

In the new Syrian five-year plan (1971-75), major objectives in the agricultural sector centre around the creation of conditions to allow full advantage to be taken of the increased irrigation which is to come from the Euphrates dam, to be completed during the plan period. Attention will be given to the diversification of agricultural production, the integration of the crop and livestock sectors, and the intensified use of modern techniques and inputs. Its principal magnitudes are shown in Table II-29. The 8.2 percent overall rate of growth planned compares with 7.2 percent per year targeted in the second plan. The annual growth rate envisaged for agriculture is approximately double the actual growth of 2.6 percent a year achieved during the first three years of the second plan. The total volume of public investment, 6 450 million S pounds, is nearly double the 3 500 million target of the second plan, and more than three times the allocation during the first plan period (1961-65). Since actual investment during the second plan up to 1969 equalled only 35 percent of planned allocation, a great improvement in investment performance will be required if targets for the third plan are to be met. The fact, however, that impediments have been largely identified, and

TABLE II-30. – SYRIA: TARGETED AND ACTUAL LEVELS OF UTILIZATION OF AGRICULTURAL INPUTS DURING THE SECOND PLAN PERIOD

	Base year 1966	Target year 1970	Actual 1969
Fertilizer application (thousand tons, product weight) . . .	17	63	31
Improved seeds (thousand tons)	3	15	3.5
Pesticides (thousand tons, product weight)	1.5	2.5	...
Tractors (thousand units) . . .	8	11.5	9.2
Agricultural credit (million S pounds)	39	...	160
Cooperatives	600	1 200	1 028

partially removed, should help to accelerate the pace of plan implementation.

Under the three-year development plan (1971/72-1973/74) of the People's Democratic Republic of Yemen, about 60 percent of the total investment in agriculture ($25.8 million) would be allocated to irrigation. Measures for reaching the 6.0 percent growth rate in agriculture include the reclamation of some 7 500 hectares of new land and the improvement of 6 600 hectares of irrigated land. It is planned to establish a number of agricultural processing industries. Major obstacles to the implementation of this plan are reported to be the inadequacy of rural institutions and government services, and shortage of experienced technical staff and extension workers.

Many aspects of the Sudan's present five-year plan (1970/71-1974/75) have been revised following the change in government in 1970. The nationalization measures taken made the envisaged contribution of the private sector (45 percent of total capital investment) unrealistic, despite policies enacted in January 1971 to provide security against further nationalization and confiscation. The original assumptions in respect of the financial resources for the execution of the plan have therefore been reconsidered. The February 1971 version of the plan includes an upward revision of planned capital investment in the public sector from $560 million to $608 million, and in public allocations to the agricultural sector from $215 million to $226 million. The private sector is expected to invest $74 million in agriculture. The total planned capital investment in agriculture of $300 million would represent an increase of about 175 percent over actual capital investment in 1965/66-1969/70, which in turn equalled 64 percent of planned expenditure.

The Government has also merged the Ministry of Agriculture and Forests with the Ministry of Agrarian Reform and Production, and intends to reinforce development planning through the establishment or strengthening of planning units in all ministries concerned with development. These measures are an attempt to remedy the lack of coordination, fragmentation of organization and duplication of effort which hamper development planning in the Sudan, as elsewhere in the region.

Similar problems are behind a change in the planning machinery in Libya where a new Supreme Planning Board, with the Prime Minister presiding and with the Ministers of Economy and Industry, Housing, Treasury, Petroleum and Agriculture as members, was established in 1970, together with a Technical Planning Organization to replace the Ministry of Planning. In the People's Democratic Republic of Yemen, improved coordination of planning is aimed at by the recent decision to shift the Planning Board from the Economic Organization to the Office of the Prime Minister.

The United Arab Republic is at present preparing a new five-year plan (1971-75) for agriculture. The new plan apparently envisages a higher rate of growth in agricultural income than was achieved during the first plan of 1960-64 (3.3 percent per year) and the second plan of 1965-67 (2.6 percent per year). The general objectives of the new plan relate to the efficient utilization of reclaimed land, the development of infrastructure in reclaimed areas, the expansion of perennial irrigation, and to improving the productivity of available agricultural land, particularly that classified as of low quality and requiring drainage improvement. A substantial increase in the production of poultry, eggs and fish to meet the country's growing demand for protein is also planned. Better coordination of activities between the Ministry of Agriculture and the farmer cooperatives will be sought as this is considered essential to successful implementation of the plan.

In Saudi Arabia, the five-year plan (1970/71-1974/75) envisages substantial increases in crop yields as well as a 5 to 10 percent extension of irrigated cropland during the plan period. Particular stress is placed on the cultivation of high-value crops and on more efficient use of water resources. Crop production is expected to grow at the rate of 4.3 percent a year, and livestock production at 5.8 percent. Output of wheat, vegetables and meat, in particular, will be encouraged. To this effect, the import subsidy on meat has recently been removed, and that on wheat will also be eliminated.

Inducements to farmers are to include a 50 percent subsidy on the cost of fertilizers, a 33 percent subsidy on the purchase price of agricultural machinery, price support for a limited number of commodities, and grants for the development of new land and water resources. A strengthened Ministry of Agriculture and Water and a reinforced Agricultural Bank will carry out the above programme.

Employment objectives of current national development plans

As a result of the high rate of population expansion and the slow growth of job opportunities in nonagricultural sectors, a very large proportion of the economically active population in the Near East remains in agriculture (Table II-31). Between 1965 and 1970 population growth in the region averaged 2.8 percent per year. Particularly high rates have been registed in Iraq and Libya, and above average rates in Iran, Jordan, Lebanon, the Sudan, Syria and Turkey. In the region as a whole, 62 percent of the economically active population was estimated to be in agriculture in 1970, but again the propor-

TABLE II-31. – NEAR EAST: POPULATION GROWTH AND EMPLOYMENT IN AGRICULTURE IN SELECTED COUNTRIES

	Population growth, 1965-70	Economically active population in agriculture as percentage of total, 1970
	Percent per year	
Afghanistan	2.4	84
Cyprus	1.4	38
Iran	3.0	54
Iraq	3.6	48
Jordan	3.0	30
Lebanon	2.9	52
Libya	3.4	56
Sudan, The	2.9	74
Syria	2.9	48
Turkey	3.0	67
United Arab Republic	2.5	50
Yemen Arab Republic	2.3	87
Yemen, People's Dem. Rep. of	2.2	74
NEAR EAST, DEVELOPING COUNTRIES	2.8	62

tion was much higher in many individual countries. At regional level, this proportion is expected to decline to about 60 percent by 1975. Even so, in absolute numbers the economically active population in agriculture would still amount to some 40 million in 1975, compared to the estimated 34 million in 1965 and 37 million in 1970. These figures are a measure of the magnitude of the problem of providing employment opportunities in agriculture over the medium term.

The creation of productive employment is thus an important objective of the region's national development plans. The reduction of disguised unemployment and the provision of new jobs for the jobless have been regarded as the two dimensions of the employment problem. In the fourth development plan of Iran (1968-72), the objective has been spelled out as the creation of maximum fulltime productive employment so as: (*a*) to absorb those seeking employment during the plan period, (*b*) gradually to provide those in unproductive or low productivity jobs with stable and productive employment, and (*c*) to provide the necessary economic and social foundations for achieving full employment in subsequent plans. In Turkey, the creation of additional employment is envisaged as a result of rapid growth of the economy under the second five-year plan (1968-72), rather than as an independent goal. In Cyprus, the second five-year plan (1967-71) not only includes the objective of providing gainful employment for all able persons, but also of increasing their productivity by widening their skills and providing opportunities for labour to maximize its contribution to production. The Sudan's objective under the five-year plan of economic and social development (1970/71-1974/75) is stated to be the guaranteeing of full employment to the economically active population and the elimination of unemployment.

As to the planned contribution of the agricultural sector to the creation of new jobs, the countries fall into two distinct groups (Table II-32). In Cyprus no further increase in agricultural employment is envisaged, and in Israel agricultural employment will decline in absolute numbers. In all other countries of the region the agricultural sector is required to create additional employment.

The key to the achievement of the employment targets is the level and pattern of the planned investment. In nearly all cases public investment in agriculture is to be at least 25 percent of total public investment; in the Sudan it is targeted at 38 percent and in Syria at 35 percent. Primary emphasis has been placed on increasing irrigation facilities, to provide additional employment opportunities through the extension of cultivable land and more intensive production. Irrigation and land reclamation will therefore take 46 percent of the investment in agriculture in Iran, 54 percent in Turkey, 55 percent in Iraq, and 32 percent in the Sudan. The last mentioned country hopes to irrigate an additional 294 000 hectares — a 20 percent increase — and to bring 1.2 million hectares of rainfed land under cultivation. Completion of the Euphrates project in Syria, for which about 25 percent of total public sector investment has been allocated, is expected to more than double the irrigated area. Besides improving work opportunities, irrigation and land reclamation are also expected to raise the income levels of agricultural workers and distribute employment more evenly among the various regions. Under the arid conditions of the Near East, long-term employment prospects in agriculture depend almost entirely on an increased and regularized water supply.

TABLE II-32. – NEAR EAST: AGRICULTURAL EMPLOYMENT IN PLANS OF SELECTED COUNTRIES

	Plan period	Employment in		Increase during plan period	
		First year of plan	Target year	Number	Annual rate
		..... *Thousands*			*Percent*
Cyprus	1967–71	96.8	97.0	0.2	0.1
Iran	1968–72 [1]	3 372.0	3 598.0	226.0	1.3
Iraq	1969–74	1 449.8	1 770.4	320.6	4.1
Israel	1971–75	102.0	97.0	— 5.0	— 1.0
Sudan, The	1970/71–1974/75	5 925.0	6 400.0	475.0	1.6
Syria	1966–70	679.0	774.0	95.0	2.7
Turkey	1968–72	10 560.0	10 860.0	300.0	0.6
United Arab Republic [1]	1965–70	3 800.0	4 460.0	660.0	3.3

[1] This plan was not implemented.

The only plan which attempted to measure the amount of additional employment which would be generated by projects to expand the area under cultivation was the second five-year plan of the United Arab Republic. In this plan it was estimated that 64 000 additional workers would be required for land reclamation and 144 000 for cropping (the latter estimated on the basis of the number of operations for each crop, and the equivalent man-days required for each operation per hectare for each crop). This would have represented about 32 percent of the target of additional employment laid down in the plan.

Aside from the provision of new jobs, a number of countries have set quantitative targets for reducing underemployment or disguised unemployment.[41] In Iran, underemployment in the agricultural sector would be reduced from an indicated 37 percent of the labour force to about 21 percent by the end of the fourth development plan, while in Cyprus the aim is to reduce it from an estimated 15.5 percent in 1966 to about 8.3 percent in 1971. In Turkey, disguised unemployment is envisaged to decrease under the second plan from 9.9 percent in 1967 to 1.1 percent in 1972. In general, these reductions are to be achieved through the intensification and diversification of production, better land and water use, the introduction of new crops, the development of animal husbandry, the provision of adequate supplies of agricultural requisites, and the enlargement of production units: all measures to reduce seasonal unemployment and expand total labour use. In the United Arab Republic, where a major difficulty in increasing productivity is the small size of holdings, the land-use system is being reorganized in such a way that the same crop would be cultivated on adjacent holdings over large areas. In the plans of both Iran and Turkey, the development of handicrafts and agriculture-based industries is regarded as important for fuller use of manpower in agriculture.

The use of labour-intensive production techniques as a means of increasing employment is also planned in some countries. In the second five-year plan of Turkey, stress was laid on research to determine which types of equipment provided maximum employment without hindering the productivity of investment. In the same country, employment creation is a criterion in determining project priority.

When a gap has been anticipated between the actual and the targeted employment increase, special programmes for employment creation have sometimes been included in development plans. For this reason community development programmes were given importance in Turkey's first five-year plan (1963-67). In Somalia, besides the measures included in the short-term development plan of 1968-70, the Government has initiated an increasing number of self-help schemes financed by funds collected from the community, sometimes matched by government funds and assistance from the World Food Programme, for the construction of roads and canals and the clearing of land, mainly with a view to providing work for the rural unemployed.

Forest policies

The principal forestry problems remain the inadequate forest cover, and its further depletion through overgrazing; the encroachment of deserts and the role of afforestation in combating it; and the growing net import position of the countries of the region in their trade in forest products, now in the range of $200 million a year.

Aridity of climate and shortage of water are the main obstacles to afforestation and the establishment of industrial plantations. As a result, afforestation is proceeding at the relatively slow rate of only some 10 000 hectares a year. Nevertheless, efforts are being increased in some countries to develop forestry, also in order to provide rural employment and diversify economies. In some cases increasing income from oil is helping to solve the financial problems inherent in such long-term investment, particularly that for purely protective purposes.

Thus Libya has greatly expanded its sand-dune fixation and afforestation operations. Saudi Arabia has taken steps to protect and develop the country's few natural forests in the Assir and Hijaz mountains, and started a sand-dune fixation programme in the eastern province. A sum of $15 million has been provisionally allocated under the five-year development plan for this purpose. The five-year development plan of the Sudan envisages an expenditure of 4 250 000 Sd pounds on 28 forestry projects. In the United Arab Republic about 10 million trees have been planted during 1970. Modern grazing regulations have been drawn up in Cyprus, and are being successfully applied, in an effort to stop overgrazing of forest lands.

Regional integration

The implementation of the Arab Common Market (ACM),[42] established in 1964 in the framework of the Arab Economic Unity Council, is proceeding, but a number of difficulties remain to be overcome. Intratrade is expanding, but slowly and with wide variations from year to year; it still accounts for

[41] The definition of disguised unemployment is by no means uniform in the countries of the region, hence intercountry comparisons cannot be made.

[42] Current members are Iraq, Jordan, Kuwait, Syria and the United Arab Republic. The Kuwait legislature has not, however, ratified the ACM agreement.

less than 4 percent of total ACM trade in all commodities. Recent measures include removal (as of 1 January 1971) of tariff barriers and administrative restrictions on all locally produced agricultural and industrial commodities, except tobacco, between Iraq, Syria and the United Arab Republic. A reduction of the tariff on tobacco, at a rate of 20 percent a year, will start on 1 July 1971. Jordan has not implemented these measures, but consultations to solve this country's special problems are to take place this year. The Sudan and the Yemen Arab Republic, although members of the Arab Economic Unity Council, have not yet started to implement the ACM trade liberalization scheme.

Proposals for a unified external tariff have been completed but not yet approved, and the Central Customs Organization that would apply it, starting in January 1972, is still under consideration. This organization would also be responsible for the collection of customs revenues and their distribution among the member countries.

The implementation of the Arab Payments Union, approved in 1969 with a total capital of 15 million Kuwait dinars, has been repeatedly postponed and intratrade accounts continue to be settled bilaterally. The Arab Fund for Economic and Social Development, on the other hand, is making progress. Thirteen Arab countries have agreed to subscribe 81 million Kuwait dinars of the Fund's total capital of 100 million, and a number have already deposited the agreed 20 percent of their subscriptions. Headquarters will be in Kuwait, the largest contributor. Emphasis in the Fund's operations will be on regional projects. Investments will be covered by the proposed system of multilateral investment insurance against noncommercial risks.

A number of factors can be identified which appear to be responsible for the small trade in agricultural products within ACM, and its slow growth. One is the narrow range of commodities produced within the area, and the reliance on petroleum or a few agricultural primary products for export earnings. The undiversified production structure and its lack of complementarities give little scope for exchange. Moreover, since the bulk of agricultural products have no tariff protection, reduction or removal of tariffs as such cannot be expected to result in any significant expansion of trade.

The effective implementation of the agreed liberalization of those tariffs which do exist, and of nontariff barriers, has, moreover, been hampered by the absence of any supranational authority to ensure that all commitments have been met. A number of permanent intergovernmental committees and subcommittees do exist within ACM, but they are more forums for consultation than supervising bodies. Consequently, although tariffs and restrictions have in principle largely been dismantled, most countries have continued to control administratively the trade in principal agricultural commodities in a manner that has tended to discourage intraregional exchanges, and only trade in commodities of limited intraregional significance has generally been made free. Such controls reflect in part the general aim of self-sufficiency in basic foodstuffs, in part the fact that the economies of most countries of the region are largely state regulated — much of the trade being carried out by state trading enterprises, and the overall trade policies and regulations geared to the requirements of the development plan and foreign exchange budgeting. Foreign exchange allocations are made to meet essential food needs, but imports which would compete with domestic production and nonessential agricultural imports that could be traded within the region have generally been discouraged. On the whole this has tended to remove much of the significance of trade liberalization measures, and at times may have been in direct conflict with the objective of trade expansion. Another factor is the practice in some countries of providing special inducements for exports to convertible currency markets through export premiums, while in others bilateral agreements with extraregional countries have tended to favour trade with third countries at the expense of other ACM members. The fact that customs duties are an important source of revenue in some countries of the region is also reported in certain cases to have led governments to favour imports from nonmember countries at the expense of duty-free imports from within ACM.

More generally, the heavy demand for resources arising from the current political situation has diverted governments' attention from efforts to expand trade, and made them less willing and able to carry the short-term burdens which would necessarily arise from adjustments in patterns of trade and production. As a result of these policies, the process of integration has so far had little, if any, effect on the agricultural sectors of the member countries.

A serious additional constraint on the growth of intraregional trade is inadequate regional infrastructure. In some cases trading partners are reported to have been unable to take full advantage of the elimination of tariff or other restrictions for this reason. The building up of the necessary facilities and institutions, and the coordinated promotion of intraregional trade, are therefore essential elements for the expansion of agricultural trade within ACM.

The above considerations suggest that if the integration movement is to result in expansion of intratrade in agricultural products, it will be essential for ACM to look beyond the existing patterns of production and trade, toward a situation where differences in comparative advantages can be more fully exploit-

ed. A useful first move would be an examination of the present commodity price levels, and the policies affecting them in the various member countries. No mechanism for this exists at the moment. Nor are there mechanisms to coordinate production activities and investments — a further necessary step toward a more dynamic concept of economic integration — which would involve structural transformation and fuller use of resources in agriculture, the promotion of specialization in production through coordinated allocation of investment in various subsectors, and the harmonization of policies. True, a subcommittee on the coordination of agricultural production has been established, but so far it has not undertaken any detailed studies of the problems and potentialities of a coordinated development of ACM agriculture. Yet it is here that the greatest efforts should be made if the various members are to gain benefits from the agricultural integration process.

Clearly the best way to bring this about would be through the harmonization of the development plans of the member countries. The Arab Economic Unity Council has in fact agreed in principle to take steps toward such a goal, as regards both the agricultural and other sectors, but so far very little has been done. Industrial cooperation is mainly promoted by the Industrial Development Centre of the Arab states. The proposed Arab Agricultural Development Organization, which will come into being once the agreement to create it is ratified by a sufficient number of Arab countries, will be responsible for the coordination and promotion of agricultural development.

The only other active integration scheme in the region is the Regional Cooperation for Development (RCD). Trade between the members[43] is still insignificant, but preparatory studies are now under way for the reduction of tariff barriers and the establishment of a Union for Multilateral Payments Arrangements. Greater cooperation is also planned between the export promotion agencies of the three member countries. Heavy engineering projects will be distributed throughout the region according to the conclusions of a study at present being carried out by the United Nations Industrial Development Organization (UNIDO). Satisfactory progress has been made in the field of joint enterprises, telecommunications and insurance.

A measure of the incompleteness of economic integration moves within the region is that the economic relations of the various countries with the European Economic Community (EEC), even though they are members of either ACM or RCD, continue to be handled individually. Iran and Lebanon have non-preferential trade agreements with EEC, covering their main exports to the Community. EEC has recently offered Lebanon and the United Arab Republic a 55 percent tariff reduction on about 57 percent of its industrial and agricultural imports from the two countries. A tariff cut of 40 percent will be applied to citrus fruit.

Turkey's association with EEC has entered the transitional stage which will last for 22 years and provide concessions on 90 percent of Turkish agricultural exports to EEC countries. Major agricultural commodities affected include tobacco, which is to enter the Community duty free, and oranges and other citrus fruits which are to have a 40 to 50 percent preference. All Turkish industrial goods, excluding a few textile products, will become duty free. The free movement of labour and the harmonization of economic and commercial policies are to be continued.

Israel concluded in 1970 a five-year preferential trade agreement with EEC, which provides tariff reductions of some 50 percent on about 85 percent of Israeli industrial and agricultural exports to the Community. An immediate tariff cut of 40 percent has been applied to citrus fruit. Israel in return has agreed to lower tariffs gradually by 10 to 30 percent on about half of its imports from the Community.

[43] Iran, Pakistan and Turkey.

Africa

Most countries in the region recorded improved performances in their economies over the previous year. Those of Cameroon, the Democratic Republic of the Congo, Ivory Coast, Kenya, Liberia, Malawi and Nigeria expanded, in real terms, by between 5 and 8 percent. These relatively high growth rates were largely the result of increased output of minerals and manufactured goods, and were facilitated by the comparative political stability enjoyed in the region. A recovery in petroleum output combined with higher prices was mainly responsible for Nigeria almost regaining its 1966/67 level of GNP. Iron ore production in Liberia increased as did copper output from the Democratic Republic of the Congo and Zambia, though lower copper prices more than offset the greater volume of production. The manufacture of cement — essential for irrigation purposes — showed satisfactory progress, thanks in

part to the establishment or extension of factories in Algeria, Dahomey, Madagascar, Mali and Togo. Fertilizer production increased notably in Algeria, Ivory Coast, Tanzania, Tunisia and Zambia.

Agricultural production, by contrast, was rather disappointing. Weather conditions adversely affected food crops in particular. Cereal production remained virtually stationary in spite of good results for wheat in north Africa and maize in South Africa.

The value of agricultural exports, however, is estimated to have risen by some 10 percent in 1970, largely as a result of higher world market prices for coffee, tea and, to a lesser extent, cocoa. The quantum of agricultural exports increased by only about 3 to 4 percent. Exports of cotton grew both in volume and value. Information on agricultural imports is still incomplete but indications are that wheat imports increased, particularly in north Africa, and rice imports decreased as the major importing countries raised their domestic output. The Yaoundé Convention between the European Economic Community and 21 African countries was renewed for the period 1971-75 inclusive and provides these countries with EEC financial assistance and trade advantages.

Increased attention is being focussed on programmes to diversify the economies in the region. Results were already evident in 1970 in the expansion of production for domestic markets, mainly food cereals, livestock and fishery products. While agricultural and rural development was accorded priority in most development programmes, an increasing number of countries tended to devote more resources to oil and mineral prospecting, particularly in west Africa. The provision of social infrastructure, employment creation and improving farm incomes are also receiving more attention, and Algeria, Ethiopia, Ghana, Kenya, Mauritius and some other countries have initiated special programmes to provide more employment.

TABLE II-33. – AFRICA: INDICES OF AGRICULTURAL PRODUCTION

	1966	1967	1968	1969	1970 (preliminary)	Change 1969 to 1970	Per caput agricultural production in 1970
	1952-56 average = 100					*Percent*	*1952-56 average = 100*
PRODUCTION IN THE SUBREGIONS (all products)							
Northwestern Africa	87	100	130	109	118	+ 8	79
Western Africa	150	150	144	155	157	+ 1	102
Central Africa	129	132	139	145	144	—	106
Eastern Africa	144	147	149	159	157	— 1	108
Southern Africa	129	130	136	138	138	—	89
SOUTH AFRICA	146	183	161	169	168	— 1	115
PRODUCTION IN DEVELOPING COUNTRIES [1]							
Total							
All products	134	138	142	147	148	+ 1	
Food only	128	132	137	140	141	+ 1	
Per caput							
All products	100	101	101	102	100	— 2	
Food only	96	97	97	97	95	— 2	
REGIONAL PRODUCTION [2]							
Total							
All products	135	143	144	149	150	+ 1	
Food only	131	138	140	143	145	+ 1	
Per caput							
All products	101	104	103	104	102	— 2	
Food only	98	101	100	100	98	— 2	

[1] Excluding South Africa. – [2] Including South Africa.

Agricultural production

The preliminary index for 1970 indicates that total agricultural production in Africa increased only slightly. There was a steep, although still only partial, recovery of production in northwest Africa, but in all other subregions output remained practically unchanged (Table II-33). In per caput terms, agricultural production declined in all developing countries of the region combined, and in most subregions was lower with the exception of northwest Africa where it increased.

The continuing extreme dependence of much of the region's agricultural production on weather conditions was vividly demonstrated during the year under review. Severe drought in Botswana, parts of Kenya, Lesotho, South Africa and Zambia caused widespread crop failure and extensive livestock losses, and in most of these countries total agricultural production stagnated or fell. The effects of the adverse weather were particularly felt in Zambia, where large quantities of maize had to be imported for the second year running. Poor groundnut harvests in the Gambia, Malawi, Nigeria and Senegal as a result of drought and lower producer prices affected the total farm output of these countries, and reduced the region's production of the crop by about 18 percent.

Cereal production in the region showed a very slight increase, mainly attributable to a 13 percent increase in the wheat harvest which, however, remained some 9 percent below the 1968 level. Cereal output, primarily of wheat, recovered well in Algeria, Morocco and Tunisia. Overall maize production was stationary, following a substantial increase (about 15 percent) in South Africa, the major producer, and reductions of varying magnitude in several countries, that of Zambia being particularly severe. Rice production fell fractionally, with good harvests in the Democratic Republic of the Congo and Madagascar.

Apart from groundnuts, 1970 was an average year for the major export crops. Of the beverage crops, cocoa and tea showed a slight increase over 1969. Record tea crops were harvested in Kenya and Malawi, thanks to favourable weather and the coming into bearing of new plantations. Nigeria's cocoa production increased by about 30 percent but was virtually stationary in Ghana and down slightly in Ivory Coast. The region's output of coffee remained at the 1969 level, with increases in the smaller producing countries (the Democratic Republic of the Congo, Kenya and Madagascar) offset by unchanged or lower output elsewhere.

Cotton production continued its steady upward trend. Uganda, the major producer, had a rather poor year with a reduction of about 7 percent, but this was more than compensated for by increases in a number of other countries, including Angola, Nigeria and Tanzania. Sisal registered a further small decline in Tanzania. Rubber production increased appreciably, thanks mainly to rises in output in Nigeria, Liberia and the Democratic Republic of the Congo.

Oilseeds showed a fall, largely owing to the poor groundnut harvest. Other oil crops advanced strongly, however, with peak production of olive oil in Tunisia and substantial increases in palm oil and palm kernel output in Nigeria and the Ivory Coast.

Among individual countries, Nigeria had a good year with an overall increase in production of 5 percent. While this represented a significant contribution toward a return to the pre-civil war level, per caput output still remained some 15 percent below that in the mid-1960s. Output of maize, millet, sorghum and rice declined slightly in 1970, but there were important gains in cocoa, cotton, rubber and tobacco. Groundnuts were the only really disappointing crop, but this was true of the whole of west Africa. Increases of the order of 5 percent were also shown by a number of other countries in tropical Africa, namely Burundi, Dahomey, Ghana, Guinea and Liberia.

For Senegal, on the other hand, 1970 was unusually bad. It was harder hit than other countries by the generally poor groundnut harvest, as groundnuts account for 80 percent of Senegal's export earnings. Three successive years of unfavourable weather between 1966 and 1969 and the termination of preferential arrangements on the French market together reduced farmers' income severely, and led to land being switched from groundnut to food crop cultivation. This had the beneficial result of a greater abundance of food but caused serious foreign exchange problems. However, in 1970 there was also a sharp decline in output of maize, millet, sorghum and rice, due to bad weather. Efforts to stimulate groundnut production, for example by reducing fertilizer prices, have not so far yielded much result. With French assistance work is continuing on the development of an early ripening, drought-resistant groundnut.

Production in Tanzania remained virtually unchanged in 1970, after a 6 percent increase the previous year. While there were substantial increases in output for some crops — namely maize, cotton, coffee and tobacco — these were offset by stagnant or lower production of others. In particular, the output of meat (except poultry) and millet and sorghum did not increase, and that of sisal fell by 3 percent.

Of all African countries the sharpest increase was in Tunisia, at 31 percent. Larger output was recorded for the majority of commodities but the main contribution was from cereals (wheat was up by 50 percent and barley about double) and olive oil, which enjoyed suitable weather conditions. In both cases, however, these increases did no more than bring production back to levels already reached and even exceeded in the early 1960s. In the main they will have been due to favourable weather and an almost automatic recovery from damage done by floods in 1969. The policy of phasing out cooperatives and returning large areas to private farming was in operation throughout 1970, but it would be premature to attribute any part of the good production results of 1970 to this.

Only very tentative indications are available on the agricultural production in the region in 1971. For the developing countries of the region as a whole, they suggest some improvement over the preceding year, and the output may rise by 3 to 4 percent, and possibly somewhat more in the case of foodstuffs. The recovery of output in northwest Africa is likely to have continued. Morocco is estimated to have had very much larger crops of wheat and barley, and there were more modest increases in the wheat harvests of Algeria and Tunisia and in the barley crop of the latter country. There was also a very large increase in the production of olive oil in Tunisia and of wine in Morocco. In southern Africa, too, total output may have risen substantially after several years of virtual stagnancy. In the other regions, the increases are thought to have been more modest.

Aside from wheat and barley, an increase is estimated for maize, with probable large increases in Malawi, Rhodesia and Zambia overshadowing a reduction in Kenya, where the wheat crop also is reported to have suffered. Rice production is also likely to have increased, with a larger crop in Madagascar, the major producer, and the Ivory Coast. Among the principal export commodities, groundnut production is estimated to be greater, with the crops in both Nigeria and Senegal very much larger. Palm-

oil production should show an increase, with larger production in Nigeria, Dahomey and the Democratic Republic of Congo. Little change is expected in the production of coffee and cocoa. Output of coffee is expected to be higher in Uganda and to a lesser extent in Angola, the Democratic Republic of Congo, and Ethiopia; but production in the Ivory Coast and most minor producing countries is estimated to be unchanged or smaller. In the case of cocoa, production may be up in the Cameroon and Ivory Coast, but little change is expected in Ghana and Nigeria, the largest producers. Tea production is estimated to remain well below the record level of 1970, with a steep reduction in Kenya and a smaller one in Uganda due to lack of rain. Cotton production too is estimated to fall short of the 1970 level because of much reduced crops in Nigeria and Tanzania.

Fishery production

Fishery production in the developing countries of Africa continued in 1970 the rising trend evident for over a decade, and the growth rate was only slightly less than in 1969 when the catch in Angola, the largest producer, showed an exceptionally big increase.

Angola's production of fish meal, the main product, was about 20 percent smaller, substantially reducing export availability. Food fish products seem to have absorbed a larger share of the catch which, according to preliminary estimates, was even higher than the 418 000 tons taken in 1969.

Morocco, the second largest fish producer in the region, increased its catch by some 15 percent to about 255 000 tons after several years of decline. There was no significant increase, however, in the catch of fish for export products, the primary outlet of the country's fishery industry. Catches of sardines, in particular, were less than two thirds the quantity taken in 1966, the peak year, and a smaller proportion was of canning quality. The country had to dip heavily into stocks to maintain the level of export shipments. To increase raw material supplies the Government is encouraging fishermen to buy larger vessels capable of reaching new fishing areas.

In west Africa, which produced more than 800 000 tons or roughly one third of the catch of the developing countries of the region, growth in some countries has been very rapid in the last few years. In Senegal, Ghana and Mali, the leading producers in the subregion, production has risen by at least 50 percent over the last five years, and a similar increase has been achieved by Togo, a smaller producer. Production in Nigeria, another major fishing country in the area, was reported to be not much below the level of the period preceding the civil war.

The bulk of the catches of west African countries comes from small-scale coastal operations, although Senegal, Ghana, Nigeria and Ivory Coast have entered high seas fisheries in recent years and other countries are planning to follow their example. Most of the production is required to satisfy domestic market needs, but export-oriented tuna and shrimp fisheries have become important foreign exchange earners for some countries. Shrimp operations are in expansion throughout the subregion. Senegal, the leading tuna producer, plans to add 20 vessels to its tuna fleet in the near future, and Ivory Coast is completing a dock construction programme at Abidjan to facilitate tuna operations.

In many countries of central Africa large man-made lakes have become an increasingly important source of fish supply in areas distant from the sea. Increases in inland production have been achieved also through intensified fishing of some of the large African lakes, especially Lakes Victoria and Rudolf. Untapped fish stocks in these lakes are estimated at several hundred thousand tons. To aid exploitation, work is under way to improve communications, production, processing and infrastructure facilities. Major development may be a matter of one or two years for Lake Victoria, but it will probably take more time in the case of Lake Rudolf.

Forest production

Although the relevant statistical data for Africa are still incomplete, it appears that removals of industrial roundwood for export remained largely static in 1970, mainly due to temporarily sluggish overseas markets for broadleaved saw and veneer logs. Ivory Coast, the largest producer, reduced its log removals by about 20 percent, which offset slight increases in several other countries, notably Gabon. No data are available on fuelwood production, which still accounts for approximately 90 percent of total wood removals in the region.

Local industrial conversion is estimated to take about three quarters of the industrial roundwood removals in the region. Available information suggests that production increased slowly in 1970, and that the overall level remains relatively low. Broadleaved sawnwood production, by far the largest single item, expanded only slightly in 1970, although it regained some of its previous impetus toward the end of the year when increased quantities of sawlogs became available locally because of reduced export sales. Coniferous sawnwood production, largely confined to east African countries, recovered by almost 10 percent, back to the relatively modest level of output already attained three years earlier.

Trade in agricultural, fishery and forest products

The African developing countries' earnings from agricultural products, which had remained virtually stationary in 1969, are preliminarily estimated to have increased sharply in 1970 as a result of larger sales of beverage crops, sugar and cotton at higher prices (Table II-34). The value of most other agricultural exports is estimated to have remained unchanged, or fallen, as did earnings from fishery and forest products. For the latter, the decline represented a reversal of the situation in 1968 and 1969, when exports of forestry products expanded sharply making an important contribution to the region's combined earnings from agricultural, fishery and forest products.

Earnings from the region's two largest export crops, coffee and cocoa, are estimated to have increased by 25 and 13 percent, respectively. For coffee, this reflected mainly the sharp rise in world market prices which started in the second half of 1969 as a result of the anticipated reduction in Brazilian supplies, and prices for Robusta (Africa's principal export coffee) averaged 25 percent higher in 1970 than in 1969. These maintained at the higher level, although prices of Arabica declined toward the end of the year. With production in 1969/70 at record levels in many African countries, there was a tendency for importers to switch to African coffee and shipments from most major exporting countries were larger, with only a few exceptions. Larger earnings from cocoa were also due both to a greater volume of shipments from most important exporters, except Cameroon, and to the higher unit values received for them in some countries. Price quotations for cocoa declined during 1970, but unit values were maintained, or fell by less, because many export sales were concluded during the preceding period of higher prices. Earnings from tea were also larger, particularly for Kenya, Malawi and Uganda, reflecting a recovery in world prices which particularly benefited African teas whose relative price in 1970 was unusually strong.

Exports of wine rose to an exceptionally high level (almost double that of the previous year) in part because of the conclusion of a barter agreement between the U.S.S.R. and Algeria, and in part because of the sharp rise in French import demand following the very low 1969 crop. These factors benefited primarily Algeria, which doubled its exports and almost eliminated its once large carry-over stocks.

The African countries shared fully in the expanded trade and higher prices for cotton which characterized world markets in 1970. The value of exports from Nigeria, Uganda and Tanzania recovered from the setback of recent years, and those of Cameroon continued to expand, bringing earnings to some three times those of a decade ago.

Earnings from oils and oilseeds and from rubber are estimated to have increased somewhat in 1970. For rubber, shipments were larger as many countries increased their production substantially. Nigeria raised its output back to the pre-civil war level and increased its exports by almost 10 percent, but the increase was insufficient to offset the sharp decline in world prices which continued through most of the year. Earnings from groundnuts and groundnut oil were lower, reflecting a second season of low production. A small increase in the value of Senegal's exports was more than offset by a sharp drop in those from Nigeria. Off-year output of olive oil in 1969 in Tunisia and Morocco reduced exports in 1970, and returns were sharply lower despite higher prices. Both volume and value of palm oil exports were higher, despite the continued expansion in domestic consumption. In Nigeria, for example, the sizable recovery in production allowed an increase in exports and consumption.

Information on the agricultural imports of the region in 1970 is still incomplete. The available data demonstrate, however, the impact of the smaller 1969 cereal crops in the Maghreb, which in recent years has taken some 40 percent of all African cereal

TABLE II-34. – AFRICA:[1] INDICES OF VALUE OF EXPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	Share of total agricultural exports in 1970	1966	1967	1968	1969	1970[2]	Change 1969 to 1970
	Percent	*1957-59 average = 100*					*Percent*
AGRICULTURAL PRODUCTS	88	113	108	116	117	138	+ 17
Food and feedstuffs	26	116	105	115	105	111	+ 3
Cereals	(2)	54	67	88	77	74	— 3
Sugar	(5)	126	127	129	150	161	+ 8
Citrus fruit	(3)	148	139	155	157	144	— 9
Oils and oilseeds	(11)	109	85	94	83	86	+ 4
Beverages and tobacco	53	113	113	123	129	163	+ 27
Coffee	(22)	158	149	165	157	196	+ 25
Cocoa	(18)	94	125	134	160	181	+ 13
Tea	(3)	229	220	253	246	322	+ 30
Raw materials	10	104	98	89	101	115	+ 13
Cotton	(6)	104	109	101	110	133	+ 21
Rubber	(2)	103	86	80	111	112	+ 1
FISHERY PRODUCTS	2	125	116	129	147	155	+ 5
FOREST PRODUCTS	9	194	192	221	259	242	— 7
Sawlogs	(6)	187	194	228	290	255	— 12
Agricultural, fishery and forest products	100	118	113	122	126	142	+ 13

[1] Excluding South Africa – [2] Preliminary estimates.

imports. Wheat imports, by far the most important, are estimated to have risen more than 50 percent, with Algeria increasing its purchases from 400 000 to 450 000 tons, Morocco from 100 000 to 358 000, and Tunisia from 306 000 to 425 000 tons. While for Tunisia the 1970 wheat imports were the highest on record, in the case of Algeria and Morocco they still remained below the peak levels of 1966-68.

Exports of fishery products are estimated to have risen by some 5 percent in 1970. Angolan shipments of fish meal were below the previous year's record volume, although above the 1965-69 average. Morocco, because of shortages of raw material of export quality standard, was able to maintain the level of canned sardines exports only by virtually exhausting its stocks. Declining production also affected tuna exports, while other export raw material such as mackerel and anchovy was in somewhat larger supply than a year ago. In spite of the lower volume of shipments, export earnings of the Moroccan fishery industry increased in 1970 because of rising world prices.

Export earnings of west African tuna and shrimp fishery countries were also estimated to have been higher, more because of higher prices than of any substantial production increases. Opportunities for further expansion are to some extent limited, because growing evidence of overfishing of tuna along the entire coast and of shrimp on some coastal trawling grounds may necessitate the imposition of catch limitations.

Shipments from Mali to other countries in the region, traditional customers for its fish supplies since before recorded history, are continuing to decline, as the importing countries expand their own fisheries.

For several countries in the region, notably Ivory Coast and Gabon, forest products remain a major source of export earnings. Although the bulk of this trade consists of roundwood, exports of more processed wood products are increasing slightly. In contrast to the rapidly rising trend in recent years, however, the value of forest products exports from the region declined, though from a high level (Table II-34).

Exports of logs from west and central African countries fell, mainly because of sluggish market conditions in a number of western European countries, the largest market for African forest products. The fall was particularly steep (24 percent) in Ivory Coast, the largest log exporter in the region, while Gabon, second in importance, was able to increase its log exports by about 3 percent because of the preference of plywood manufacturers for okoumé as a raw material. Limba logs from the Lower Congo area have also been in heavy demand throughout the year.

Although data for sawnwood, veneer and plywood are still incomplete, it appears that exports of plywood and veneer increased further, although in quantity terms they remain much less important than logs. Gabon, the main plywood producer, increased its exports by 15 percent, from 70 700 cubic metres in 1969 to 81 300 cubic metres in 1970. On the other hand, the country's already very small sawnwood exports were reduced by almost one third, while Ivory Coast, one of the more important exporters, increased its shipments by about 10 percent.

Technological progress

It is always difficult to assess the rate at which technological progress is taking place across a whole continent. Figures, such as consumption of fertilizers or numbers of tractors, give only a rough indication and may relate almost exclusively to a limited modernized sector, while traditional farming continues largely unchanged. It may be that a series of modest improvements in the crop and livestock husbandry methods of traditional farmers — better utilization and conservation of existing water supplies, more timely planting, greater use of cattle dips and so on — will have more impact on production than the application of more advanced technology by a minority of farmers who can at present afford it and use it profitably. Yet countless minor improvements being introduced all the time by many farmers cannot be expressed quantitatively and for this reason may be overlooked.

This point is clearly illustrated by the progress of farm mechanization in Africa — mechanization in the broad sense of a partial or total replacement of human labour by other sources of power. In African conditions animal traction, with suitable implements, is much more widely applicable than electricity or the internal combustion engine. Use of the latter, however, can be more easily measured.

There has been a noticeable trend in the past year toward the greater use of animal draught equipment, particularly in Senegal, Cameroon and elsewhere in west Africa where needs can be met largely by local manufacture. In east Africa, factories for animal draught equipment and hand tools have existed for some time, notably in Kenya, Uganda and Malawi, and other countries such as Burundi and Madagascar are planning to set up manufacturing facilities for this purpose. After earlier setbacks in some countries, power mechanization is on the increase and private hire schemes, for instance in Ghana, Kenya and Morocco, are reported to have given good results, although insufficient availability of credit for this purpose is holding back progress. The creation of the West African Rice Development Agency (WARDA) in September 1970 should give a new impetus to

mechanized systems of rice cultivation and harvesting.

One factor which hampers the introduction of more intensive forms of agricultural technology in Africa is the very limited area under irrigation in most of the region, except in Madagascar and the Maghreb countries. In recent years, however, increasing interest has been shown in expanding this area. A number of factors lie behind this change, principally the increasing population density in areas such as the savanna zone in west Africa, and the low rainfall, high population pockets in east Africa. Another factor is the role irrigation plays as a vehicle for the successful introduction of modern agricultural technology. This is not to say that without irrigation new technology cannot be introduced, but it is often the greatly increased productivity made possible by irrigation that provides the incentive for the use of high-yielding varieties of seeds, and fertilizers and more intensive agronomic practices.

An additional impetus is given by the drive to replace rice and sugar imports by domestic production in many countries of the region. These two commodities show the best returns on investment in irrigation, especially sugar which is attracting substantial commercial investment in recent years, notably for the Bacita irrigated plantation and sugar factory and the planned New Mound sugar estate in Nigeria. A switch from rice to sugar cultivation to improve economic efficiency is the aim of the Richard-Toll settlement project in Senegal. In Mauritania, technical studies are nearing completion for the Delta project in the Senegal basin, which will irrigate 5 000 hectares for rice cultivation.

The absence of a tradition of irrigation in Africa (with the exception of the Maghreb and Madagascar) is a constraint to its rapid growth. Much of the present irrigation development in Africa south of the Sahara is therefore necessarily on a relatively small scale; a pilot activity forming the basis for later large-scale development by providing the necessary experience and skills. However, some relatively large projects are already in the planning stage in west Africa, such as the Manantali dam in Mali, the Delta barrage on the Senegal and the Lake Chad project in northeast Nigeria, which were conceived within the overall water development plans for the Senegal and the Chad basin. Another example is the Tiga rapids project in northern Nigeria which will irrigate 16 000 hectares when completed in 1974.

In Madagascar, where more than 20 percent of the cultivated area is irrigated, work continued on the hydrological development of the Morondava plain under UNDP/FAO auspices. Considerable possibilities remain to be exploited but require detailed preliminary studies because of the frequency and violence of cyclones, which often seriously damage barrages and irrigation channels. This was the case in the Bas-Mangoky area where repair work was financed by the Fonds européen de développement (FED) to the extent of 1 000 million MG francs during 1970.

The situation in the Maghreb countries is very different. Major efforts are being made for the full utilization of relatively meagre water resources, by tapping new resources and improving the effectiveness of existing schemes. Modern groundwater development and use are increasing, as the case of Tunisia shows. One of the largest undertakings moving into the construction stage is the Sebou region scheme in Morocco which, through a programme phased over 20 years, will provide irrigation for about 150 000 hectares.

Controlled irrigation has been an essential input in the dramatic increase in cereal production, which has recently been achieved in a number of developing countries, especially in Asia. The principal new factor, however, has been the use of improved seeds capable of providing greatly increased yields. This has heightened the interest of other countries in programmes for the production and supply of improved seed.

In Africa, most progress has been made in the Maghreb, where some well-equipped seed centres are in existence. However, trained manpower is lacking. In Africa south of the Sahara, Kenya has a well established cereal scheme; production of hybrid maize seed in 1969/70 covered 1 720 hectares, with an estimated production of 5 000 tons of quality seed of improved varieties. In Zambia, maize seed production increased by 26 percent from 1 869 tons in 1968/69 to 2 363 tons in 1969/70, and in Burundi it almost trebled from 36 tons in 1968/69 to 107 tons in 1969/70.

Despite these encouraging instances, systematic multiplication of seed is limited to few countries and crops. Most countries have some activity, but the development of new varieties usually has not gone beyond breeders' fields. Seed is generally produced without effective control, and the quality is therefore low and variable. Seed legislation, if existent, is normally not enforced.

Nevertheless, general awareness of the importance of quality seed is paving the way to increased action to improve seed production and use. FAO is assisting Algeria in seed potato and vegetable seed production, Mali in rice seed and Ghana in cotton seed production. Indications are that due to financial, technical and organizational limitations, many countries of the region would welcome outside assistance in seed development. Requests for such assistance have been reported from Cameroon, Central African Republic, Chad, Ethiopia, Malawi, Niger, Nigeria, Swaziland and Uganda.

As for fertilizers, the other key input in more intensive production techniques, consumption in Africa remains very low. Most countries are making efforts to increase their use both through extension services and by providing credit and/or subsidies for their purchase by farmers. In 1969/70, all countries of the region except Guinea and Mali showed increases, particularly Algeria, Kenya, Madagascar and Tunisia. There is evidence that more fertilizers are being used in both east and west Africa in the production of domestic food crops. In Kenya and Madagascar the rise was specifically associated with programmes to increase the use of high-yielding cereal varieties. The total for the region in 1970 again rose by 20 percent, to over 590 000 tons. The level of fertilizer use, however, varies widely between countries. Here, too, the progress has been greatest in Algeria, Morocco and Tunisia, which together account for 40 percent of total consumption in developing Africa.

Production of fertilizers also continues to expand rapidly. In 1969/70 it increased by 22 percent, to 480 000 tons. Most countries of the region are, however, more dependent on imports than the figures on consumption and production would suggest, since the region is a net exporter of phosphatic fertilizers, mainly from Morocco and Tunisia. Fully 82 percent of total consumption of nitrogenous fertilizers in 1969/70 was based on imports, and 69 percent in the case of potassic fertilizers. Eleven of the 40 developing countries in the region which are known to apply chemical fertilizers have manufacturing plants, and 8 other countries have plans for establishing them.

Recent and planned increases in production are mainly for nitrogenous and phosphatic fertilizers, for which raw material is available in some countries in the region. In 1969/70, manufacture of potassic fertilizers was initiated in the People's Republic of the Congo, and production of nitrogenous fertilizers in Algeria and Zambia. Projects now in the implementation stage include ammonia plants in Gabon, Nigeria and Rhodesia, and a plant for phosphoric acid and compound fertilizers in Tanzania. The total capacity of these plants, most of which are planned to start operating in 1971 or 1972, is estimated at 805 000 tons (product weight) of nitrogenous fertilizers, slightly more than the region's net imports in 1969/70, and 590 000 tons (product weight) of phosphatic fertilizers.

Research for developing agriculture

Although a wide range of research into problems of developing agriculture in Africa has been undertaken over the past half century or longer, the main emphasis has been on raising output, productivity and quality of major export crops, while research on basic food crops has been relatively neglected. Research, conducted in Africa and elsewhere, has made a major contribution to the expansion of production and exports of palm oil, groundnuts, rubber, cocoa, coffee, tea, cotton, sisal, and so on. But the growth and diversification of African economies and the rising demand from a growing and increasingly urbanized population have shown the need for research to help produce more and better food for domestic markets.

An important landmark in establishing research facilities to meet present-day needs of tropical Africa was the opening in March 1970 of the International Institute of Tropical Agriculture (IITA) in Ibadan, Nigeria. Established by the Nigerian Government with the support of the Ford and Rockefeller Foundations, IITA will concentrate on improving tropical food crops important in local diets, including sorghum, millet, maize, rice, cowpeas, yams, cocoyams and cassava. Research programmes will cover plant breeding and genetics to develop high-yielding varieties and to raise their protein content; the development of rotational systems to replace the present "bush fallow"; and control of losses through pests and disease, both in the field and in storage.

To secure the widest possible application of research results, particular emphasis is placed on their dissemination and on encouraging wide testing under field conditions, both in Nigeria and elsewhere. Already IITA, in cooperation with the Institut de recherche d'agriculture tropicale et de cultures vivrières of France, has staged a number of international seminars on food crop research, covering the major crops, use of fertilizers and mechanization, and the efficiency of different farming systems. As a part of its effort to bring research findings to the attention of government agencies and organizations, IITA bulletins also transmit the results of research work carried out at the International Rice Research Institute in the Philippines. This vital task of recording the results of agricultural research in a readily accessible form, both for use within the countries concerned and to serve wider needs, is being assisted through the establishment of national agricultural documentation centres, including, to date, those of the Democratic Republic of the Congo, Ivory Coast, Morocco and Senegal, which will eventually be linked with the world Computerized Agricultural Research Information System.

Another example of intensified research into production of food crops is the foundation, in September 1970, by 14 countries of west Africa[44] of the West African Rice Development Association (WARDA),

[44] Dahomey, the Gambia, Ghana, Guinea, Ivory Coast, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo, Upper Volta.

which other African countries have been invited to join. It is intended to provide a coordinated and unified programme to tackle the obstinate problem of raising productivity and output of rice in west Africa, through research and improved marketing. Technical representatives from member governments, assisted by FAO, met in Rome in March 1971 to draw up a medium-term programme for rice research and development for the approval of the Association's governing council. A central system for documentation and data processing to disseminate research results to all member countries is an important feature of WARDA. The programme will also give particular attention to socioeconomic factors which influence the introduction of more advanced rice production methods, as well as to the testing of technologies under west African conditions. The focussing of attention and resources on a selected crop of major importance to the region, with emphasis on the transmission of research results to development programmes, may provide guidelines for establishing techniques which will ultimately modernize husbandry practices in a major part of the African continent, along the lines so successfully pursued with regard to rice and wheat in the Far East.

A particular characteristic of the African scene is the existence of large, more or less uniform ecological zones extending across national boundaries and politico-economic groupings. Pooling of research efforts and dissemination of results can be particularly fruitful within such zones. To promote this, FAO has started to sponsor international conferences on Cooperative Agricultural Research Programmes between countries with similar ecological conditions. The first of these conferences, covering the Sudanian zone, was held in Rome in November 1968. As a result, a number of regional research programmes have attracted the interest of prospective bilateral and multilateral donors, notably on control of rats and other rodents, storage at farm level, animal traction and meat production, and projects are at an advanced stage of formulation. The second conference, for the Guinean ecological zone, was held at Ibadan in August 1971. It concentrated on problems common to countries in the humid tropics of Africa, and covered the technical, economic and social aspects of adopting more advanced agricultural technology. A similar conference is planned for the high altitude east African zone in 1972 or 1973.

Although real progress is thus being made in establishing research programmes to find solutions for Africa's low crop and livestock productivity, the effective application of research findings remains a major problem. In an effort to overcome this, increasing attention is being given to the socioeconomic aspects of agricultural development, notably price incentives (and disincentives) to producers, farming systems and structure, supply of farm requisites, and extension services. The regional conference on agricultural marketing boards held in Nigeria in March 1971 highlighted the importance of price stabilization measures being operated for the producers' benefit and not as a means of taxation to provide funds for general development. As modern farming systems are progressively adopted, skill must be acquired in the management of new resources such as high-yielding varieties of seeds, fertilizers, mechanical equipment, and valuable livestock. A number of African countries, notably Kenya and Morocco, have established farm management advisory services to provide training for progressive farmers.

Development plans and policies

Development planning, as a means of identifying priorities and promoting the rational allocation of resources, is becoming increasingly attractive to countries in the region. Multilateral assistance continues to be sought for the services of planning economists, and to organize national planning courses. A UNDP mission visited five central African states in the latter part of 1970 and reviewed the status of planning, with a view to harmonizing the economic policies within these countries and exploring the possibilities of further UNDP and FAO assistance.

In 1970, 11 [45] African countries ended their development plans. It is not yet possible to assess adequately the performance under these plans, due to lack of information. Preliminary data from Ghana suggest, however, that the country succeeded in reversing the fall in the rate of growth between 1965 and 1967, with a rise to about 9.5 percent a year between 1967 and 1969. This compares with 9.9 percent projected under the two-year stabilization plan, and was achieved despite the fact that capital receipts from foreign sources, particularly of aid, fell short of expectations. Output in the forest sector grew by about 12 percent, nearly three times the rate foreseen. In Cameroon, the economy achieved a growth rate of more than 10 percent during the period of the second plan (1966-70), almost twice that expected. This performance is attributable to increased output, better management of the public sector, and favourable conditions for exports, which in the last year of the plan totalled 64 000 million CFA francs, compared with the projected 58 700 million.

The first national development plan of Kenya, which ended in 1970, achieved the planned growth rate of 6.3 percent per year; however, there were

[45] Cameroon, Central African Republic, Chad, Dahomey, Gabon, Ghana, Ivory Coast, Mauritania, Niger, Rwanda and Togo.

significant swings in the yearly growth during the plan period, ranging from 0.5 percent in the drought year of 1964/65 to 14.5 percent in the recovery year of 1965/66. Sizable increases were recorded in the output of cereals and tea and the nonmonetary sector is estimated to have grown by over 4 percent per year compared with the planned 3.2 percent. Gross farm income increased annually at 4 percent while that of the smallholders grew at 10 percent, reflecting the success of the "intensification schemes," which provide a package of inputs including credit, extension services, high-yielding varieties of seeds, and fertilizers and pesticides, together with an expansion in irrigation facilities and measures to consolidate holdings. However, exports grew at a rate of only 2.2 percent a year, instead of the 4 percent planned.

The Zambian development plan was extended to December 1971 instead of the originally scheduled date of July 1970, due to unfinished programmes and the addition of new projects. Even so, real GNP during 1966-69 rose at an average of 13 percent per year, compared with the target of 11 percent, mainly because copper prices were higher than anticipated.

Some features of development planning in Africa bear special mention. One is the reduced expectation of and decreasing dependence on foreign aid and investments for the realization of programmes. Past experiences have dictated this change. The new Nigerian development plan (1970-74), for example, expects to finance 80 percent of public sector investment from the country's own resources. This is in strong contrast with the last plan, half the expenditure of which was to have been financed by foreign sources, and only 20 percent was in fact thus funded. Ghana received only 45 percent of expected foreign aid under its two-year plan which ended in 1970.

In many countries, emphasis has been put on rural development and investment in social infrastructure as a way of slowing down migration to the towns, where pressure from growing numbers of unemployed continues to increase. While efforts to improve the welfare of the population and enhance life expectancy continue, in a number of countries family planning is also receiving increased attention as the pressures exerted by high population growth on job availabilities are very strong. At the same time the creation of sufficient employment has assumed crucial importance in the development policies of many countries. In Kenya, the Government, private employers and trade unions signed in 1970 a one-year agreement under which private and government employment would be increased by 10 percent, while unions would make no new wage demands. Additional employment for Kenyans has been a principal aim of the activities of the Bureau of Kenyanization. In Mauritius, the "Travail pour tous" programme is providing relief work for the unemployed, and an active diversification programme in the agricultural sector is expected to provide additional employment. In Ghana, measures in this field include reserving certain types of work for Ghanaians, giving preference to labour-intensive projects in government investment when feasible, and the creation of a National Service Corps to provide employment and teach skills to young people.

Diversification of agricultural production, particularly to reduce excessive dependence on particular export crops, continues to be an important aim in most development plans. In Mauritius, where sugar accounts for almost 90 percent of both agricultural production and total export earnings, diversification provides the basis for the country's development strategy. To this end, a UNDP-financed land and water resources survey was completed by FAO during 1970. Also important to the region is the coffee diversification scheme of the International Coffee Organization, which will help Ethiopia, Kenya, Ivory Coast, Madagascar, Tanzania and Uganda to diversify their agriculture through the expansion of the livestock and horticultural subsectors. Tanzania has already taken steps to shift part of its resources out of sisal. The Gambia and Senegal continue their efforts to reduce their dependence on groundnuts, and Ghana on cocoa.

During 1970, Algeria, Botswana, Kenya, Lesotho, Mali, Mauritania and Nigeria published their development plans,[46] while Cameroon, Gabon, Ivory Coast, Mauritius, Niger and Togo launched theirs in the first part of 1971 (see Table II-35). A major concern of the Nigerian 1970-74 plan is to establish the basis for future development, including a programme of reconstruction of the areas affected by the civil war. Highest priority is accorded to transport, education, agriculture and industry. The planned annual growth of 6.6 percent in GNP may be conservative in view of the fact that oil production is expanding faster than was forecast and international prices for oil are now considerably higher. On the other hand the expectation that a 3 percent annual increase in agricultural production could, as is stated in the plan, help provide a more adequate diet for a population of some 68 million, supply more raw materials for local processing industries and contribute to higher export earnings, seems rather optimistic in view of a population growth of some 2.5 percent per year. Also optimistic in view of past experience are the planned surpluses of some £N 64 million from the state produce marketing boards. In a move toward the involvement

[46] The plan of Kenya was reviewed in *The state of food and agriculture 1970*.

TABLE II-35. – AFRICA: MAIN FEATURES OF CURRENT DEVELOPMENT PLANS

	Currency	Duration of plan	Scope [1]	Investment		Foreign exchange component of total investment	Share of agriculture		Planned growth rate of:						
									GNP	Agricultural production		Export earnings		Employment	
				Total	Public		Total investment	Public investment		Total	Cereals	Total	Agricultural	Total	Agricultural
				Million currency units		..... *Percent*			..... *Percent per year*						
Algeria	Dinars	1970–73	PS	—	27 740	—	—	18.0	9.0	4.5	...	9.5	...	...	...
Botswana	Rands	1970–75	PS	130	...	...	...	...	15.0	...	...	...	...	8.0	...
Burundi	RBF	1968–72	C	16 500	...	...	72.0	...	6.0	...	...	...	...	...	...
Cameroon	CFAF	1971–76	C	280 000	145 300	...	10.5	15.5	6.7	4.0	...	9.4	...	...	...
Ethiopia	Eth.$	1968/69–1972/73	C	2 865	1 484	...	10.9	7.0	6.0	3.1	...	...	...	...	...
Gabon	CFAF	1971–75	C	150 000	65 000	...	1.2	1.2	...	...	...	...	...	...	...
Gambia, The	£ Ga	1967–71	PS	—	5	—	—	13.0	...	...	...	...	...	...	...
Ivory Coast	CFAF	1971–75	C	505 000	210 000	...	11.0	22.0	7.7	4.1	...	6.8	3.0	5.5	4.0
Kenya	K £	1970–74	PS	—	192	—	—	21.0	6.7	4.5	...	...	...	5.0	4.5
Lesotho	Rands	1970/71–1974/75	C	60	28.8	...	...	23.0	5.0	3.1	...	...	...	...	...
Malawi	M £	1969–71	C	70	...	...	17.0	...	...	...	...	...	...	...	...
Mali	MF	1970–72	C	77 573	69 592	...	25.0	25.0	5.0	4.5	5.3	...	...	5.0	...
Mauritania	CFAF	1970–73	C	47 135	...	...	15.0	...	...	...	...	...	...	...	...
Mauritius	Mau Rs	1971–75	C	1 052	536	...	20.0	21.0	7.0	...	...	...	...	6.0	5.0
Morocco	Dirhams	1968–72	PS	5 050	3 000	...	46.0	...	5.0	...	...	...	...	...	...
Niger	CFAF	1971–74	PS	47 631	...	...	15.0	...	...	...	...	...	...	...	...
Nigeria	N £	1970–74	C	1 595	780	...	...	17.0	6.6	3.0	...	...	...	...	...
Senegal	CFAF	1969–73	C	145 400	124 900	65.0	29.0	32.0	5.4	5.9	...	3.6	...	...	...
Swaziland	Rands	1969–74	PS	—	23	...	...	14.0	...	...	...	...	...	...	...
Tanzania	T £	1969–74	C	404	296	...	13.5	23.0	6.7	4.5	...	...	...	5.0	0
Togo	CFAF	1971–75	C	75 889	56 203	—	15.0	10.0	7.7	6.6	...	...	...	...	...
Tunisia	Dinars	1969–72	C	617	449	58.0	21.0	19.0	6.1	5.1	...	14.0	13.5	...	...
Uganda	U £	1966–71	C	230	80	35.0	9.0	19.0	6.3	5.1	...	4.4	...	...	...

NOTE: Where possible, data refer to net investment. In many cases, however, no distinction is made in the plan, and data may refer to gross investment or may include some elements of recurrent expenditure. The agricultural sector includes animal production, fisheries, forestry, irrigation, land reclamation, community development and agricultural extension.

[1] PS = public sector; C = comprehensive.

of the states in the programming of the country's development, the Federal Ministry of Agriculture is coordinating intensive studies by the 12 states for a perspective plan for the agricultural sector extending to 1985.

Lesotho launched its first development plan (1970-74) at the end of 1970. Major emphasis is given to agricultural development and almost one quarter of total public investment is allocated to that sector. The planned 5 percent annual growth for GDP at current prices and 3.1 percent for agricultural output may not provide, however, much real progress in view of the annual increase in population of about 2.5 percent, and continued inflationary pressures. Moreover, the planned increase in agricultural output may be difficult to achieve because of the current low levels of productivity and the problem of soil erosion.

The five-year development plan of Botswana proposes to tap the massive mineral wealth of the country, and expects on this basis to achieve the very high growth rate in GDP of 15 percent per year. The broad aim is to promote rural development and generally raise living standards. Special emphasis is placed on manpower development, family welfare, and conservation of mineral resources. The rate of population increase is expected to decline from the present 3 percent per year to 2.5 percent, and employment creation is projected at 8 percent per year over the plan period. The planned growth rates seem rather high but may well be achieved if development of mineral resources proves successful.

The strategy of the new Algerian plan (1970-73) is essentially similar to the 1967-69 plan, the major effort being concentrated on massive investments in industry (45 percent of the total, a slightly lower proportion than in the 1967-69 plan, but more in absolute terms). The annual rate of increase in GDP is expected to reach the high level of 9 percent by 1973. Agriculture is to receive 15 percent of total public investment but the increase in agricultural production foreseen is only about 3 percent annually. Agricultural development is to be based primarily on irrigation, reforestation, diversification (horticulture, fruit production), and increased production of fodder crops to enable larger numbers of better quality livestock to be kept. The authors of the plan are under no illusions about the difficulty of modernizing Algerian agriculture, since it is first necessary to change the traditional outlook and methods of the farmers, a task complicated by the severe shortage of agricultural technicians and extension workers at the farm level. Although the plan itself does not mention land reform, a draft law is at present under discussion.

The Ivory Coast is reported to have drawn up a three-year programme of public investment for 1970-72, designed to make the transition between the completed development plan of 1967-70 and that for 1971-75, still being elaborated. Projects for the first two years of the new plan are included in the three-year programme, which provides for a total investment of 141 000 million CFA francs, with an allocation of 33 000 million for agricultural development.

A ten-year agricultural development plan has been prepared in Sierra Leone by an FAO team (Sierra Leone currently has no overall development plan). The plan proposes a coherent programme of specific development projects which should, over the decade, establish a base for modernizing the agricultural sector. The plan, which projects a total investment of 11.2 million leones over the period 1970/71-1974/75, aims at self-sufficiency in food and an increased output of export crops.

Forest policies

Great efforts are being made by many African governments to carry out forest inventories to provide a firm basis for the development of this important resource. In a number of cases they have been helped through various aid programmes. There are plans to make inventories over large forests in the Congo basin of the Democratic Republic of the Congo with assistance from Canada, which will also cooperate in inventories of selected areas of natural forests in Tanzania. Current inventories in the People's Republic of the Congo, Gabon and Cameroon are being assisted by UNDP and FAO. One of the most important in Africa is the inventory of Liberia, to which the Federal Republic of Germany gave bilateral technical assistance. Other important inventories are being planned or initiated in southern Senegal (Casamance province) and Ivory Coast.

In the meantime, new wood-processing industries are being created and existing installations expanded in many countries. Good progress is being made in west African countries such as Ghana and Ivory Coast. Aside from the main primary forest industries — sawmills, wood-based panel industries, pulp and paper mills — plants have been built for the manufacture of knock-down furniture produced in series for exportation, as well as for semiprocessed timber to meet very specific requirements. There is also a striking growth of interest in the pulping of tropical timber, and important overseas pulp and paper companies are examining possibilities of setting up pulp mills in the rain forest areas of central and west Africa (Ivory Coast and Gabon). At the same time feasibility studies are being conducted locally, for example in Ghana through the National Investment Bank and in Zambia with the help of UNDP/FAO. Madagascar has started a large-scale pine afforestation programme with a view to producing pulpwood for a pulp mill with a yearly output of 200 000 tons. The accentuation of interest in forest industrialization at a time when activities in some concessions had been greatly reduced — partly due to difficult competition in the world market — shows that medium- and long-term prospects for development of forest industries in Africa are regarded as promising and that this evaluation is not being affected by certain short-term difficulties. Improvement of transport facilities is important in this development and plans for road and railroad links and for improved or new harbour facilities are being implemented in many countries, including Gabon, Ivory Coast and Liberia.

In line with the increasing interest in forestry development goes recognition of the need for strengthening national forestry institutions. Thus, Ghana is engaged in preparatory work for the establishment of a forestry commission; in Togo, a forestry development and management office is being set up; in Tanzania a wood industries corporation has been established; in Nigeria a Federal Director of Forests has been appointed; and in Ivory Coast the state forest development corporation has been strengthened and given increased responsibilities. At the same time, steps are being taken to strengthen forestry education facilities to provide the necessary trained staff and to update forest legislation. The Department of Forestry now being set up at the University of Lovanium in Kinshasa will be an important addition to the hitherto very inadequate facilities for

French-speaking forestry students. Facilities for English-speaking students — already catered for by the Department of Forestry at the University of Ibadan (Nigeria) — have recently expanded following the establishment, with bilateral Norwegian aid, of the Department of Forestry at the Makerere University College in Uganda. In addition to the already functioning school at Mweka (Tanzania), the second African school for the training of wildlife specialists in Garoua (Cameroon) started its first course in November 1970. Upper Volta is engaged in reviewing the conditions under which concessions are being granted. Ghana is reexamining its legislation relating to wildlife and national parks management, and in Mali new regulations have been enforced which provide for improved financing of the forest service from government forest revenue.

The Maghreb countries have maintained their lead in afforestation in the region. In all of developing Africa another 80 000 hectares are estimated to have been planted in 1970, which would bring the total area covered by man-made forests in the region to about 1.4 million hectares.

Regional economic cooperation

Most countries of the region continue to be involved in plans for subregional cooperation schemes, although studies and agreements are still more numerous than concrete measures toward implementation. Arrangements have been finalized by the United Nations Economic Commission for Africa (ECA) to convene a meeting in 1971 of representatives from multinational economic groupings in order to review their activities, exchange views and experiences on economic cooperation, consider measures for coordination of programmes, and decide priorities. The ECA/FAO Joint Agriculture Division has completed a series of studies which constitute the first phase of a programme to determine how intra-African cooperation and trade in agriculture could best be promoted. Reports covering individual subregions were published in 1970 and 1971. The first of a series of seminars with government representatives of the subregion is to be conducted in west Africa in December 1971, to review the report and to discuss the procedure to be followed in the second phase.

The most cohesive of the more comprehensive regional economic groupings, the Joint Afro-Malagasy and Mauritius Organization (OCAMM), received a setback in June 1970 when Senegal withdrew from the Sugar Agreement following disaccord over the cost of importing its quota from OCAMM producers at the high agreement price. At the same time, Senegal is establishing its own sugarcane production and refining industry as provided for in the current development plan.

The heads of state of the Entente countries[47] agreed at their meeting in May 1970 on the establishment of an economic community for livestock and meat. A study on the possibility of linking Ghana with the Entente has been completed and it is hoped that a relationship can be established which will enable the Entente as a whole to take advantage of this market consisting of some 25 million people with a GNP of approximately $6 000 million. There is also a possibility of linking Mali through associate membership. The prospects for the community are favoured by the fact that the countries involved form a compact geographical unit with considerable complementarity in agricultural resources. The basis thus exists for the reciprocal exchange of livestock products from inland areas with vegetable oils and fruit, etc., from the high-rainfall coastal zones.

Other steps taken toward the formation of subregional groupings include the establishment of the West African Economic Community,[48] which is replacing the West African Customs Union, and common market and monetary arrangements to facilitate trade between the members of the Senegal River States Organization.[49] Some further progress was also made toward an agreement on economic cooperation among the Maghreb countries, although action is still largely restricted to studies and meetings rather than actual implementation.

While subregional integration schemes have not, for the most part, reached the implementation stage, bilateral agreements seem to have made more progress and are not unimportant in a region where economic relationships with the former metropolitan countries are still close. Thus Cameroon and Chad signed an agreement for the joint utilization of the Logone river waters, and another was reached by Upper Volta, Niger and Mali on the creation of an integrated development project for the region of Liptako-Gourmo, an important agricultural and livestock-breeding area. Ghana and Mali agreed to expand their mutual trade, especially in cotton, meat, cattle and pineapple juice, and orders for these products have already been exchanged, while Mali also entered into an agreement with Guinea for duty-free trade in some agricultural products.

Relationships between the European Economic Community (EEC) and various African countries were formalized with the coming into force on 1 January 1971 of both the renewed Convention of Association between EEC and the Associated African and Malagasy States, and the Arusha Convention, which creates free trade between EEC and the East African Common Market countries.

[47] Dahomey, Ivory Coast, Niger, Togo, Upper Volta.
[48] Dahomey, Ivory Coast, Mali, Mauritania, Niger, Senegal, Upper Volta.
[49] Guinea, Mali, Mauritania, Senegal.

Chapter III. - WATER POLLUTION AND ITS EFFECTS ON LIVING AQUATIC RESOURCES AND FISHERIES

Before man settled in agricultural communities he depended upon hunting and fishing for his food, and fishing has remained an important activity. Although in developed countries man generally satisfies his requirements for food fish by buying it from the small number of men who still choose fishing for their life's vocation, he continues to fish for pleasure and his expenditures for this purpose are economically important.

In developing countries, however, many men, women and children engage in subsistence fishing to supply their own needs. Commercial fishing is also becoming a big business, involving considerable manpower.

World fisheries production in 1969 was reported to be 63 100 000 metric tons — 89 percent from the seas and 11 percent (6 830 000 metric tons) from inland waters. Actual production from inland waters exceeds this latter figure considerably, however. In some areas it is estimated that subsistence fishing equals about 50 percent of the reported production, which includes only the amount of fish entering the commercial trade.

The FAO *Yearbook of fishery statistics* (Vol. 26, 1968) indicates that the 1968 commercial trade in fish amounted to 2 500 million dollars. This figure is a minimum estimate, as it does not include the sizable subsistence production and a considerable number of fishing areas do not provide the monetary value when reporting catch data.

It has been estimated that it will be necessary to nearly double present production to meet the minimum requirements for fish in 1985.[1] Production should equal 107 million tons of fish by that time, and this does not allow for any real increase in per caput consumption.

From 1958 to 1968, world production of fish nearly doubled. In 1969, however, there was a small decline, the first since 1947, when FAO began publishing its statistical yearbook. Provisional figures for 1970 show an increase of the production to a record level of approximately 67 million tons, but the drop in 1969 may presage a more gradual rate of growth and the attainment of peak production before many decades have passed. A presupposition in preparing the predictions for future needs was that the potential for producing large additional quantities of fish would depend upon man's learning to take care of the environment and instituting proper means for the management of stocks of fishes.

From earliest times the waters of the earth have been a natural place to discard unwanted wastes. Until quite recently this was not much of a problem except in localized areas near human settlements or mining activities. Now, however, the serious nature of the pollution [2] of some streams, rivers and lakes is universally recognized. Even the seas are threatened by the great centres of population and industries located on their shores and by the increasing importance of sea transportation. In addition, many industrial pollutants are carried vast distances in the atmosphere, so that man's technological activities can have a direct impact on the entire ocean, even though it covers 70 percent of the earth's surface.

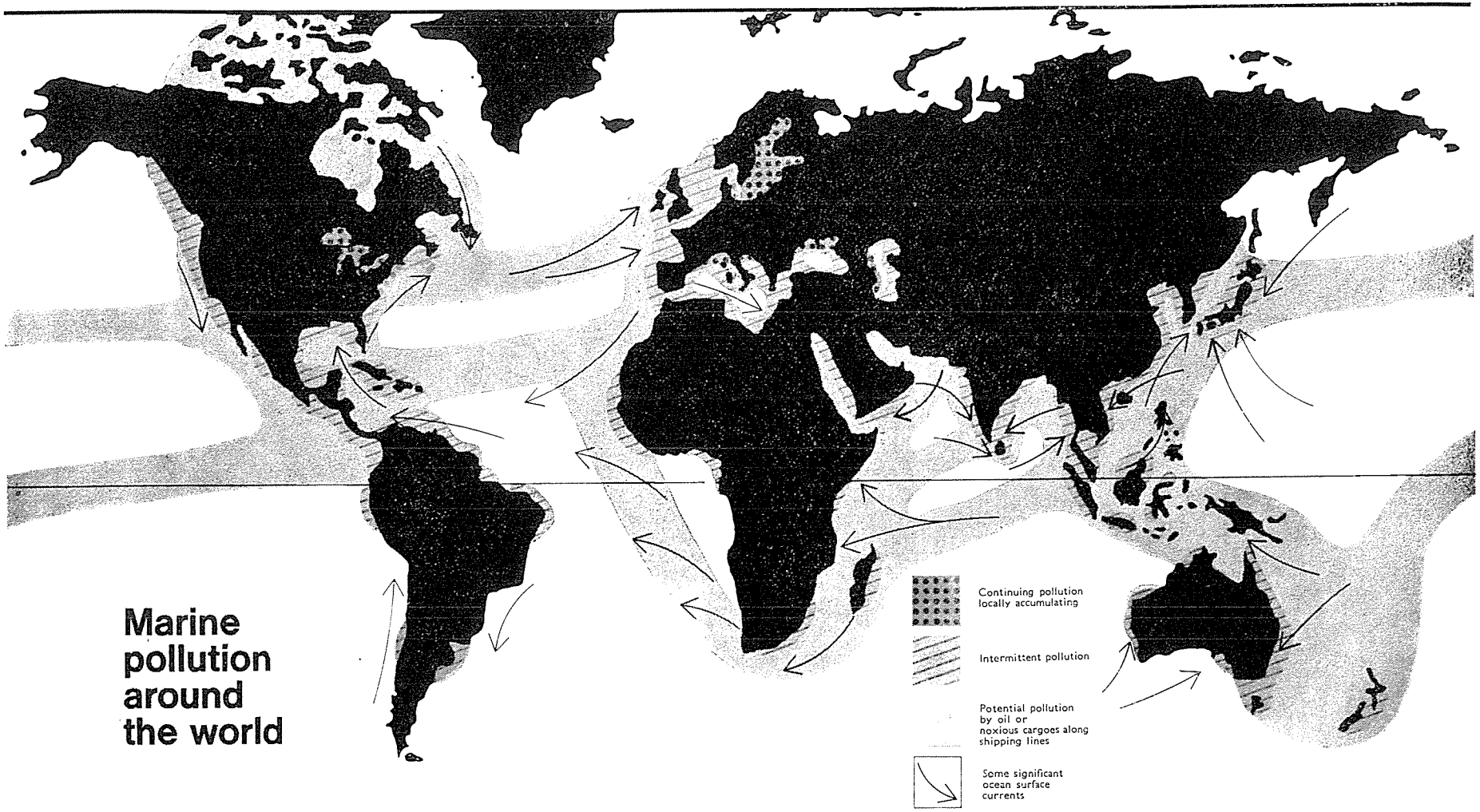
The rapidly increasing pollution of our natural aquatic environment is related to three worldwide problems which must be assessed and mastered if we are to hope to succeed in the abatement of pollution. These are: the increasing population of the world, combined with crowding in some areas; the increasing demand by the average individual for material things; and the limited nature of both renewable and nonrenewable natural resources.

During the early part of man's existence population growth was very slow, with a doubling time of 1 000 to 5 000 years. From the first century A.D. to the discovery of the New World (15th century A.D.), the population doubled about every 200 years. With the discovery and colonization of the American continent by Europeans, and the subsequent industrial revolution, the availability of new space to settle and of new things to use led to an explosive population

[1] FAO. *The state of world fisheries*. Rome, 1968. 49 p. World Food Problems No. 7.

[2] For present purposes pollution is defined as follows: introduction by man of substances into the aquatic environment resulting in such deleterious effects as harm to living resources; hazards to human health; hindrance to aquatic activities including fishing; impairment of quality for use of water; and reduction of amenities.

FIGURE III-1. — MARINE POLLUTION AROUND THE WORLD



SOURCE: M. Waldichuk, Fisheries Research Board of Canada, and Leif Andrèn, FAO.

growth. By the year 1830 the world's population had reached 1 000 million, within the next 100 years the population size doubled, and 30 years later (1960) it reached 3 000 million people. Today the total population is about 3 700 million and is still rapidly increasing.

Parts of Africa, Australia and the American continent in which the indigenous populations had been sparse were occupied by Europeans; this and several other factors contributed to the explosive population growth. Within the last century great progress made in medicine and public health has greatly extended the life expectancy of people in most parts of the world. Previously, mortality of mothers in childbirth and infant mortality had always been high. Pestilence and plague, which once decimated the affected populations, have been eliminated from most of the earth. Many serious illnesses no longer assure premature death. Recent wars, serious as they have been, have killed only a small fraction of the population — indeed, some demographers have found evidence that the western wars of the past two centuries have led to a net population increase by triggering more intense reproductive activities. Although many people in the world still suffer from malnutrition, death from this cause accounts for a much smaller fraction of the total population than ever before. Improved communications and advance warnings have reduced mortality as a result of natural catastrophes such as hurricanes, cyclones, tidal waves, and earthquakes.

Thus, in our victory over the four horsemen of the Apocalypse, we have released upon the world a set of problems of unprecedented intensity related to the explosive growth of population. A stable population size can be achieved only when the rates of birth and death are equal. Enormous resources have been used to improve health and nutrition, thus decreasing the death rate, without paying due attention to the importance of stabilizing the birth rate.

Each individual of this growing population is, on the average, using more and more material things and thus increasing the supply of wastes and adding to the pollution problem. It has been estimated that a person born in America today will utilize during his lifetime 50 times as much material as one born in a developing nation. In some cases we do not use — in the sense of use up — material things; we merely redistribute them in the environment. The iron used in the manufacture of an automobile is still iron when bits of it flake off as rust or when it is scrapped; it has been converted from a natural resource concentrated in a particular place to a waste material scattered thinly over the world's surface, but with no essential change in its character. In other cases, however, the natural resource is converted into entirely different components. When gas, oil or coal is burned the material is irreversibly changed into energy which is used briefly before it escapes as waste heat into the environment and into carbon dioxide and water and then discarded. The iron and other metallic elements which we use and redistribute and the fossil fuels we burn are examples of nonrenewable resources.

In the optimistic philosophy of the 19th century the resources of this planet were thought to be inexhaustible and they were used and discarded with abandon. But we have come to realize that natural resources of the earth are finite and that we cannot continue indefinitely in our prodigal use of them. Even though the known reserves of some of these resources are measured in decades and others in centuries, we are beginning to understand that these time limits are insignificant if man is to continue to survive on earth for additional millennia.

Substitutes can be found and are constantly being produced for many of the material things we use. The total solar energy reaching the earth far exceeds any energy use by man that can be contemplated, and techniques for the utilization of solar energy, other than in the biological cycle, are constantly being sought. Nuclear power may ultimately provide a virtually unlimited source of energy, but this will create new pollution problems, probably greater in scope than some we have already failed to solve. Plastics and other artificial materials can be substituted for many structural materials, but again, their production creates new pollution problems, particularly if the emphasis is on the properties of plastics from only a conventional economic viewpoint. Plastics chemists and other industrialists are now beginning to take ecological considerations into account, and this trend must be encouraged.

Man's expanding population and his increasing demand for material things have frequently nullified the best efforts to combat pollution problems. The only solution to pollution is the recycling and reuse of as much as possible of the materials we use, and even this is only a partial solution. Every biological, mechanical, chemical or other process produces wastes, as is clear from the second law of thermodynamics. Thus even full recycling and reuse merely postpone the inevitable day when an enormously increased population and the consequent increased use of materials will again place an intolerable load upon the environment. Ultimately, the level of resource use as well as population size must be stabilized — let us hope as the result of an intelligent choice rather than of a series of catastrophes of our own creation.

The evidence is clear that pollution is becoming progressively a matter of concern of global nature. The biological effects of pollution, and thus the long-range effects on fishery resources, particularly those of the sea, are still imperfectly known, even

though there area number of cases in which biological damage has been clearly demonstrated.

The disposal of waste materials is one of the many legitimate conflicting uses of the aquatic environment. Water has a great capacity to purify itself and this became the basis for disposal of sewage into streams, as it was thought that " dilution is the solution to pollution." It is true that so long as an area is sparsely populated, water is capable of accepting domestic waste without major effect and of cleansing itself as it moves downstream. But when an aquatic system becomes too heavily loaded, the results can be disastrous. In many parts of the world aquatic systems are so overloaded that they are already incapable of accommodating the level of use to which man is attempting to subject them.

This report is intended to document what is now known about the biological effects of pollution of the aquatic environment, to discuss the major known sources of pollution, to identify in so far as possible the problems of the future, to explore what needs to be done and to discuss the scientific, engineering, economic and legal problems which must be solved if we are to combat pollution effectively.

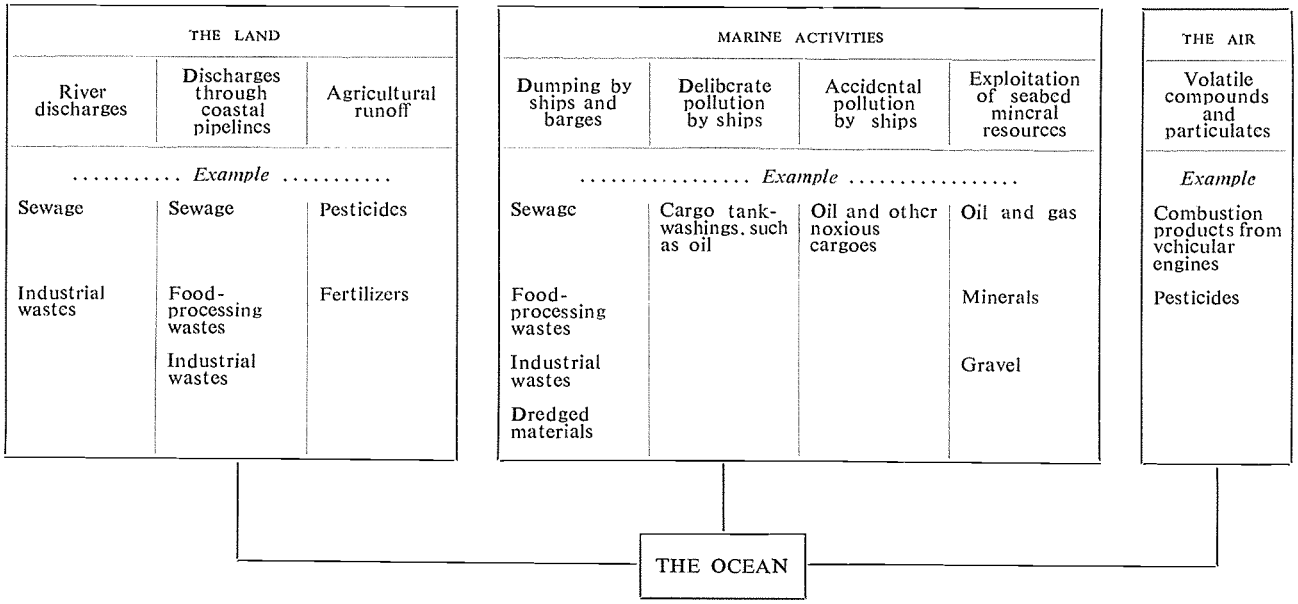
Characteristics of water pollution

Nature and sources of water pollutants

A great variety of pollutants are produced by man and many of these reach the aquatic environment either directly or indirectly. Some (most organic materials, for example) are decomposed by normal biological processes, but others, such as the chlorinated hydrocarbon pesticides, are resistant to decay and persist for a long time in the aquatic environment. For the persistent pollutants the ocean is the ultimate sink in which they accumulate in the water, in organisms or in the bottom sediments. These persistent pollutants reach the sea by a variety of transport mechanisms. Some are leached from the land or carried to sea by rivers as sediments from eroded soils; some are deliberately introduced into rivers or directly into the ocean as domestic and industrial wastes; some are dumped at sea from shipboard or are a direct consequence of ship operation; some are transported by the atmosphere for great distances from the source before being washed out by rain on both land and sea. The relative importance of these various transport mechanisms depends upon the character and source of the pollutant.

Different pollutants have different effects on living aquatic organisms and on fisheries. Some stimulate the growth of plants and could have beneficial effects if properly controlled; some are toxic and

FIGURE III-2. — THE ORIGINS OF MARINE POLLUTION



SOURCE: IMCO/FAO/Unesco/WMO/WHO/IAEA/UN Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP). *From Report of the third session, Rome, 22-27 February 1971.* Annex 4, p. 3. Rome, FAO, 1971. FAO Fisheries Reports No. 102.

can kill aquatic organisms or make them unfit for human consumption; others are innocuous and have little or no effect on the aquatic ecosystem.

The nature and sources of various types of water pollutants are briefly discussed below.

Domestic sewage and agricultural wastes

Domestic sewage and some agricultural wastes fertilize the water and increase the rate of productivity of the aquatic ecosystem. When they are overfertilized, however, the waters become eutrophic and the excessive growth of plants and algae becomes a nuisance. The eutrophication of lakes is a serious problem in almost all developed countries and can serve as a model for what is likely to happen to estuaries and possibly the coastal ocean if present trends continue. Lakes that have been clear and clean for thousands of years have become repulsive and malodorous within ten years after man-made effluents were introduced (Hasler, 1969). Excessive amounts of nutrients change the algal community from one of great diversity of species to one of a few; the species which are eliminated are commonly those which form the food of the herbivorous animals which in turn feed the fisheries resources of the area. The species which grow in abundance are generally the blue-green algae or other species which are mostly unsuitable as food for the grazing animals. The changes in the plant population thus indirectly cause changes throughout the entire ecosystem, even in organisms which are not directly affected by the pollution. The species able to survive are usually less valuable as a fisheries resource from an economic point of view. Thus, among the first species to disappear from overenriched lakes or estuaries are the trout and salmon, and the survivors are the pollution-tolerant cyprinids.

When untreated domestic wastes without toxic materials are discharged into an aquatic environment, they are quickly attacked by bacteria and decompose to their inorganic constituents, assimilating dissolved oxygen from the water in the process. When this occurs in confined bodies of water such as lakes, estuaries and embayments having restricted circulation, the oxygen required for decomposing the waste may exceed the oxygen content of the water. The body of water then becomes devoid of oxygen and most forms of its animal life perish. Thus man's activities have created another ecological disaster.

In recent decades a variety of treatment processes for sewage have been developed, but the main objectives were aesthetic and protection of public health, with little thought given to the prevention of environmental and ecological damage. Thus primary sewage treatment will remove a great amount of solid materials, but only about 10 percent of the phosphorus, one of the most important fertilizing elements. Secondary treatment of sewage removes only about 30 percent of the phosphorus content. The remaining nutrients in the effluent are generally higher by a factor of several thousand than the naturally occurring nutrients in the receiving waters. The fertilized growth of phytoplankton can then reconstitute organic material by photosynthesis to produce as much or more of it as was removed at great expense from the sewage in the treatment plant.

So long as the nutrients and the resulting algal populations remain at or near the surface of the water, the plants actively produce oxygen during daylight and impose no threat to the oxygen balance of the system. At night, the algae respire and may decrease the oxygen content even of the surface waters to undesirably low levels. When the algae die, they sink to the deeper waters and in the process of decomposition all of the oxygen can be consumed. In any case, dense algal blooms are unsightly and undesirable from an aesthetic or recreational point of view, as they impart a distinct coloration (and often an unpleasant odour) to the water. Affected beaches and resort facilities no longer attract people and earlier scenes of beauty become offensive and depressing. Many lakes, even such large lakes as Lake Erie, have become eutrophic and the fisheries resource has been seriously damaged or eliminated. The same trend can also be observed in various lagoons in tropical areas (e.g., near Abidjan and in the Mediterranean area near Tunis).

Many streams and rivers have become highly polluted with domestic sewage and many estuaries, because of the dense populations living on their shores, are also in a serious state. In Lake Erie, for example, the fish requiring cold bottom water for survival in warm summer periods died off when the bottom water became anoxic. This lake still produces large fish catches, but the commercial value of the pollution-tolerant species is only a small fraction of that of the original whitefish, lake herring, lake trout and blue pike which were eliminated by a combination of intensive fishing, eutrophication and other stresses.

Eutrophication of lakes, streams and rivers can be reversed (Hasler, 1969). Tertiary treatment is a means of removing most of the phosphorus and nitrogen fertilizers from the sewage effluent, but these processes are still largely in the experimental stage. Another approach being tried experimentally in several places is to spray the sterilized, nutrient-rich effluent on crop lands where it serves a dual purpose of irrigation and fertilization. Another approach to the prevention or correction of eutrophication is to divert sewage from an aquatic area of sluggish circulation to one in which circulation, mixing and

dilution are vastly greater. The recovery of Lake Washington in Seattle has been dramatic as a result of the diversion of pollution which originally entered the lake and which is now collected, treated and discharged into Puget Sound, where circulation is intense. Similar results are being noted in European alpine lakes, such as the Zeller See of Austria.

Recycling and reuse of the valuable materials in domestic and agricultural wastes is one potential solution of the problem. The use of the effluent for irrigation and fertilization is an example of recycling of the essential elements. The potential for use of sewage in aquaculture is still largely unutilized, though it is practised with success in some countries and offers good prospects for the future.

Some form of tertiary treatment and the utilization of the nutrient elements in domestic sewage appear to be the only long-range solution of this pollution problem. The ecologist can estimate how much of the fertilizing elements are acceptable to any given receiving waters, provided the rate of circulation and mixing is known (Ketchum, 1969). For example, it can be estimated on this basis that the Hudson River estuary, which at present receives the sewage effluents of 12 million people, can satisfactorily receive and recover from the sewage of no more than 1.2 million people.

A treatment plant also produces a sludge consisting of the solids removed from the sewage. Most municipalities dispose of this sludge on land after mineralization, though in a few places it is dried and incinerated or used as a soil conditioner or fertilizer. It is not a very good fertilizer because the nutrients in the sewage sludge are not present in the proportions needed by plants. Enrichment with the deficient nutrients could improve this. Many coastal cities barge the sewage sludge to sea where it is dumped. The effects of this disposal on the environment are described below in the discussion of solid wastes.

Many have argued that it would be more satisfactory to discharge sewage sludge at greater distances from shore and in deeper waters. At first glance this seems to be a suitable alternative method of disposal, since the natural populations in the waters off the edge of the continental shelf are sparse and biological damage would be reduced. But evidence has been presented to show that the rate of decomposition of materials under the conditions of high pressure and cold temperature typical of this area is much slower than it is at the same low temperature at atmospheric pressure (Jannasch, 1971). Disposal of waste into this type of environment would therefore merely preserve it for posterity and not be a disposal at all in the proper sense of the term.

The unavoidable conclusion therefore is that recycling and reuse of the organic material and the fertilizing elements in sewage is the only acceptable method of treating and disposing of domestic wastes. Many of the methods of doing this are still experimental, but it is a technological development which must be encouraged if we are to reclaim some of our overfertilized fresh and marine waters and prevent eutrophication of additional bodies of water.

Detergents

The detergents in use today account for about 60 percent of the phosphorus content of sewage effluent in some developed countries, contributing to the problems of eutrophication. However, sewage effluents are usually already rich in this element, containing about 2½ times as much phosphorus as nitrogen by weight. As we have seen, normal plant populations of the aquatic environment require less phosphorus than nitrogen, and thus, even if all the detergent phosphorus were removed from sewage, the product would still be unbalanced and deficient in nitrogen compounds. In some areas this may well be compensated by agricultural and industrial wastes which are rich in nitrogen.

Biological fixation of nitrogen from the atmosphere can be carried out by several bacteria and by blue-green algae. When the phosphorus content of the water is excessive and the available nitrogen has been completely removed by plant growth, conditions are ideal for the development of these nitrogen-fixing populations. Thus, in the natural system, excess phosphorus can lead to objectionable growth of blue-green algae and bacteria, even when the available nitrogen supply of the water body is exhausted. Blue-gree algae are one type of organism which leads to the discoloration and malodorous conditions characteristic of eutrophication.

In many estuarine and coastal areas the growth of the phytoplankton population is already limited by the low nitrogen content of the water. The present attempts to replace the phosphorus in detergents with compounds of nitrogen may indeed be as damaging, in the sense of overenrichment of the water, as would be continuation of the present use of phosphorus compounds, since an essential nutrient in short supply would constantly be added and under certain conditions would make the effluent itself a better fertilizer, with obvious implications for accelerated eutrophication.

The recent introduction of active enzymes in washing powders has still not been adequately evaluated. Excessive concentrations in the sewage could interfere with the biological processes in the normal sewage treatment plant and render them inefficient. It is claimed that these enzymes will deteriorate rapidly in the water or in the sewage before it reaches the sewage treatment plant and that negligible amounts

will be present in the effluent from such a treatment plant, but additional research is needed to establish whether or not this is actually the case.

PESTICIDES

DDT and other chlorinated hydrocarbon pesticides [3] have been used extensively since the mid-forties, and in recent years average production has increased at the rate of about 8 percent yearly. In 1966 more than 625 000 tons of synthetic organic pesticides were produced. In 1966/67 (the latest estimate available) world production of DDT was about 85 000 tons. DDT and its decomposition by-products have become widely distributed throughout the world and have had profound biological effects.

It should be emphasized that these chlorinated hydrocarbons are unique man-made compounds differing greatly from organic material which is readily decomposed by bacterial action. As neither bacteria nor any other organisms have evolved which are capable of rapidly decomposing these chlorinated hydrocarbons, they persist in the environment for long periods of time. It is this combination of persistence and biological effects which has caused great concern about the continued use of these pesticides.

The short-term benefits of the use of DDT are undeniable. Malaria has been virtually eliminated from some areas by using DDT to kill the anopheles mosquito. The control of insect pests on commercial crops has been dramatic: it has been estimated that a farmer gains in increased production about five times the value of his investment in DDT. But it is now apparent that the unexpected deleterious side effects of the use of DDT bear a real cost which man has not yet been obliged to pay in full. These hidden environmental costs are not, of course, included in the farmer's balance sheet.

Table III-1 shows the relationship between pesticide use and crop yields for various parts of the world (*Study of Critical Environmental Problems*, 1970, p. 119). The first five regions rank in the same order for pesticide use and crop yields; increased use of pesticides clearly increases crop yield. The relationship is not a direct proportion, however. Pesticide use in Japan is six times greater than in Europe, but the yield is increased by only 60 percent. The yield is, of course, affected not only by pesticide use but also by many other factors such as character of the land and agricultural practices.

About 99 percent of the potential plant-eating insect pests in the world are controlled by natural means. Man attempts to control only a few thousand pests, most of them on commercial crops. With

[3] For example, dieldrin, endrin, toxaphane, heptachlor, chlordane.

TABLE III-1. – PESTICIDE USE AND AGRICULTURAL YIELDS IN SELECTED WORLD AREAS

Region or country	Pesticide use		Yield	
	Grammes per hectare	Rank	Kilogrammes per hectare	Rank
Japan	10 790	1	5 480	1
Europe	1 870	2	3 430	2
United States	1 490	3	2 600	3
Latin America	220	4	1 970	4
Oceania	198	5	1 570	5
India	149	6	820	7
Africa	127	7	1 210	6

SOURCE: FAO, *Production yearbook*, 1963.

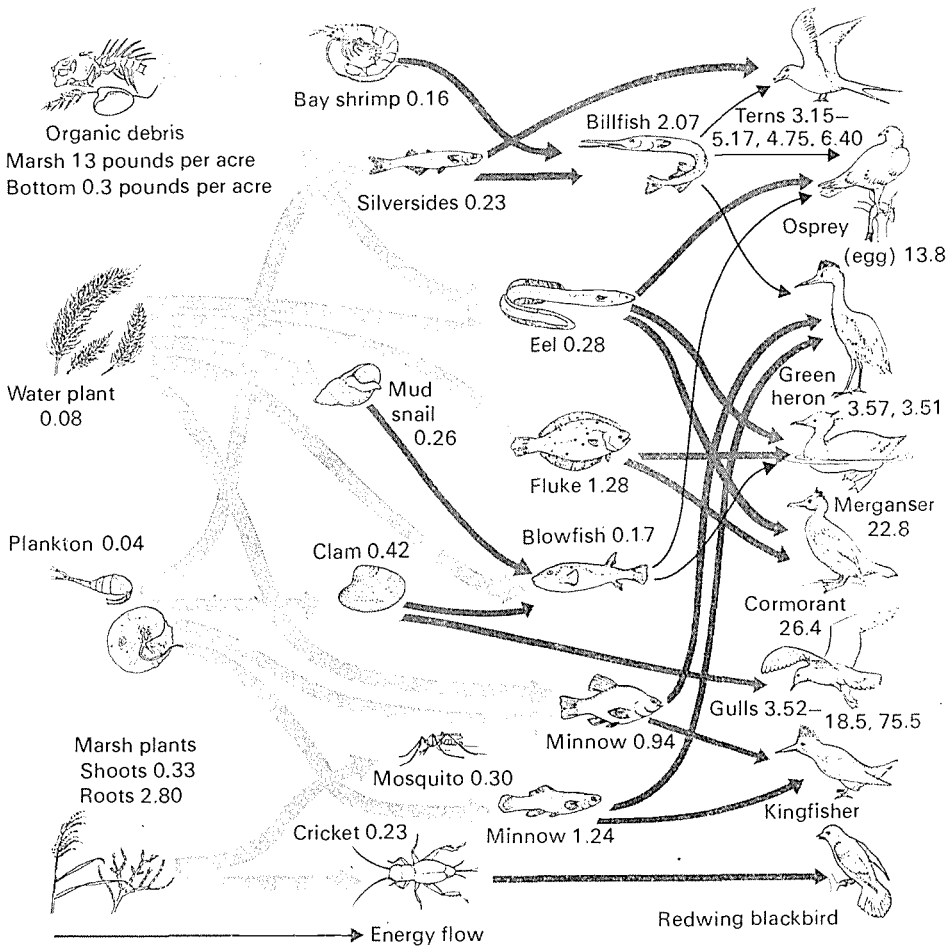
continued use of DDT on crops in a given area, however, the pests being controlled develop strains increasingly resistant to DDT, so that the rate of application has to be increased.

Many of the birds which spend most of their lives at sea, as well as many other predatory birds (e.g., the bald eagle, the common loon, the osprey, the peregrine falcon, and the sea eagle), have had their populations drastically reduced because of the accumulation of DDT in their tissues. This interferes with reproduction and the eggs fail to hatch because of breakage during incubation. Continued buildup of DDT in the marine ecosystem around the world can be expected to cause increased reproductive failures in many marine species of birds.

The phytoplankton of the surface waters are the primary producers and source of all organic material which nourishes other organisms in the sea. The photosynthesis of single-celled marine algae is inhibited by DDT concentrations of 10 parts per billion (ppb) or more (Wurster, 1968; Menzel, Anderson and Randtke, 1970). The solubility of DDT in sea water has been estimated at 1 part per billion — or one tenth of the inhibitory concentrations found in the laboratory experiments for phytoplankton. However, DDT, which is fat soluble, may be concentrated in oil films, and phytoplankton subjected to this type of dual contamination may well be affected.

Because DDT accumulates in the lipid pool of organisms it tends to become more and more concentrated as it is passed to higher levels of the food chain (see Figure III-3). Grazing zooplankton accumulate higher concentrations of DDT than is found in the phytoplankton they eat, because the DDT is not metabolized but is stored in their fatty tissues. The top level carnivores, birds and carnivorous fish accumulate the greatest amounts of DDT and it is among these creatures that the greatest effects have been found.

FIGURE III-3. — PORTION OF A FOOD WEB IN A LONG ISLAND ESTUARY



Arrows indicate flow of energy. Numbers are the parts per million of DDT found in each kind of organism. [After Woodwell. "Toxic Substances in Ecological Cycles." *Copyright © 1967 by Scientific American, Inc. All rights reserved.*]

Both freshwater and marine fish are almost universally contaminated with DDT or its decomposition products, which have physiological effects similar to DDT itself. Large quantities of California mackerel have been condemned because the concentration of DDT residues exceeds the 5 parts per million (ppm) tolerance established for edible portions of the fish. The coho salmon which was recently introduced at great expense into Lake Michigan has been condemned on the same basis. These are examples of cases in which the fish itself survives, but the fishery is drastically affected because of the contamination of the product.

Direct toxicity of DDT on adult fish has not been established in the field, but it has been shown that a concentration of 5 ppm in the ripe eggs of freshwater trout causes 100 percent failure in the development of the fish. The mortality occurs at the time of the assimilation of the yolk sac. Butler (1969) has found a reduction in sea trout populations in the Laguna Madre (Texas) from 30 fish per acre in 1964 to 0.2 fish per acre in 1969. He further states that no juvenile fish have been observed there in recent years, although in less contaminated estuaries about 150 kilometres away there is a normal distribution of sea trout year classes.

Butler (1965) has shown that commercial species of shrimp and crabs are killed by exposure to DDT at concentrations of less than 0.2 ppb, which causes 100 percent mortality in less than 20 days. DDT also interferes with the growth of oysters at levels of as low as 0.1 ppb in the surrounding water (Butler, 1966). In the Ariake Sea (Japan) agricultural pesticides caused large-scale mortality of shrimps in 1953 and of soft clams in 1962.

Thus the evidence is clear that there is a direct effect of DDT — at concentrations considerably less than its solubility in water — on the viability and growth of crustaceans and molluscs. The evidence is also clear that the breeding of some species of

fish and of many species of birds is reduced by DDT concentrations in the yolk sacs of fish and by its interference with the shell development of birds.

It is impossible to construct a complete and authentic balance sheet of the distribution of DDT in the environment. It is assumed that the marine environment is the ultimate sink for DDT which will enter the oceans either through atmospheric transport (probably the major source) or transport by the rivers, which appears to be comparatively minor (*Study of Critical Environmental Problems*, p. 132, 135). It has been estimated (ibid., p. 135) that as much as 25 percent of the DDT compounds produced to date may have been transferred to the sea. The amount in the marine biota is estimated to be in the order of less than 0.1 percent of the total production to date, but even this small quantity has already caused a demonstrable impact upon the marine environment. The residence time of DDT in the ocean is unknown, so that it is still impossible to say whether the marine environment has achieved a steady-state distribution or whether the concentrations will continue to accumulate even if DDT use is reduced and restricted to public health purposes in which little is allowed to escape to the environment.

Other chlorinated hydrocarbons are apparently becoming as widespread as DDT in the environment, but their biological effects have not been adequately assessed. Several are used as insecticides, fungicides and herbicides. The polychlorinated biphenyls (PCBs), used extensively in industry as plasticizers in both plastics and rubber production, are quite toxic and have been found wherever the analytical test was suitable for their detection. The more the problems of these unique nonbiodegradable compounds are studied, the more unexpected damaging side effects are discovered. In view of the results of scientific investigations of the past decade any prediction of further progressive deterioration may be an underestimate.

Because of the damaging environmental effects, the use of chlorinated hydrocarbon pesticides may eventually be limited to critical public health needs in which minimal amounts are released to the environment. General agricultural use of DDT has been banned in many countries, and it is likely that it will be further limited in most of the developed countries. Developing countries, however, need food, and crop production does increase with increasing use of DDT. Before it can be eliminated, adequate substitute insect pest control methods must be developed and made available.

There are available several substitute insecticides which are less persistent in the environment and are quickly decomposed and rendered harmless. The lack of persistence in the environment means, however, that more frequent application is necessary for the same degree of control. These substitute pesticides are generally more expensive than DDT, and their general environmental effect will only be known after prolonged use. Also, many of the organophosphorus compounds are more toxic to mammals and man than is DDT as is shown by the data in Table III-2. Several economic and scientific problems must thus be solved before the agricultural use of DDT can be phased out completely in developing countries.

TABLE III-2. – TOXICITIES AND HAZARDS OF SOME INSECTICIDES THAT WILL BE SUBSTITUTED FOR DDT

Insecticide	Acute oral LD_{50} [1] rates	Acute dermal LD_{50} [2] rates
	Milligrammes per kilogramme	
Phorate	1.1– 2.3	2.5–6.0
Demeton	2.5– 6.2	8– 14
Parathion	3.6–13.0	7– 21
Ethion	27–65	62–245
DDT	113–118	2 510

SOURCE: *Farm Chemicals*, 1970.

[1] Oral intake that has lethal effects on 50 percent of a test population. – [2] Contact with the skin that has lethal effects on 50 percent of a test population.

OIL AND OIL DISPERSANTS

Oil is rapidly becoming one of the most widespread contaminants of the ocean. Blumer (1969, 1970) has estimated that between 1 and 10 million tons of oil per year may be entering the oceans from all sources. Most of this influx of hydrocarbons takes place in the coastal regions. However, oil slicks and tar balls have been gathered in the open Atlantic by skimming the surface with a fine-meshed net (Horne, Teal and Backus, 1970). Oily substances have also been observed in the middle of the Mediterranean and in other regions, making it apparent that oil pollution of the oceans has become a problem of major significance to the fisheries of the world.

Oil is a mixture of many compounds, and a crude oil may contain thousands of different compounds. Crude oils from various sources differ markedly in composition and physical properties as well as in the relative concentrations of their individual components. The various refinery processes to which crude oil is subjected for special uses are designed to isolate specific parts of the compounds, but even refined oils are complex mixtures of many types of hydrocarbons.

All crude oils contain compounds toxic to marine organisms. Some are soluble in the water, some evaporate on the surface, some form extensive and widespread slicks, and others settle on the bottom

and incorporate large amounts of sand in globules. Thus, depending upon which of these processes is predominant, different types of oil spills can be expected to have somewhat different effects. Complete understanding of the toxicity and ecological effects of oil spills will probably require extensive studies of the effects of individual components, or at least of the classes of components which make up the original oil. The divergent scientific views found in the literature today probably stem from the lack of comprehensive data. Only a few oil spills have had adequate scientific investigation, and our understanding of the ecological effects has changed and developed greatly over the last few years. Some earlier studies of the effects of oil suffered from inadequate methods of analysis. It is only recently that the development of gas chromatography has made it possible to isolate and identify various fractions of oil and to follow these as they enter the marine ecological system and are transferred from organism to organism.

The oiling and subsequent death of large numbers of marine birds is one of the earliest and most obvious effects of oil spills.

When an oil spill occurs near shore or an oil slick drifts to the intertidal zone and beaches, extensive mortality of marine organisms is found, including species of commercial value.

Two of the most publicized oil spills in recent years were the wreck of the tanker *Torrey Canyon* and the blowout of an oil well at Santa Barbara, California. Both of these disasters occurred offshore in relatively deep water. Although the oil reached the beaches in both cases, only the edges of the slicks were involved and they may have been well diluted and modified by evaporation and sinking before reaching the beach. Entire plant and animal communities in the intertidal zone at Santa Barbara were killed by a layer of encrusting oil which was often 1 or 2 centimetres thick. At other locations where the oil was not so obvious, intertidal organisms were not severely damaged, at least during the few months after the beginning of the blowout. A large number of intertidal organisms and organisms on the beach were killed in the water of the *Torrey Canyon* spill, but it was impossible to distinguish between the effects of the oil itself and of the detergents and dispersants used in an effort to control the oil pollution.

A relatively small oil spill in West Falmouth, Massachusetts (1969), has perhaps been the most intensively studied of any in history. Massive destruction of marine life occurred immediately after the accident. A wide range of fish, shellfish, worms, crabs, and other crustaceans and invertebrates were affected. Bottom-living fish and lobsters were killed and washed ashore. Within a few days most of the dead animals had vanished and the visual evidence of the oil had almost disappeared. Careful chemical and biological analyses revealed, however, that even a year and a half after the spill, identifiable fractions of the source oil could be found in organisms surviving on the perimeter of the area.

One important observation of the West Falmouth study is that the hydrocarbons ingested by marine organisms may pass through the wall of the gut and become part of the lipid pool. When dissolved within the fatty tissues, even relatively unstable hydrocarbons are preserved because they are protected there from bacterial attack and can be transferred from prey to predator and possibly to man.

Hydrocarbons in the sea can be decomposed by marine micro-organisms. Very little is known, as yet, about the rate of this degradation, but no single microbial species will degrade whole crude oil. Bacteria are highly specific and several species are needed to decompose the numerous types of hydrocarbons in a crude oil. In the process of decomposition, intermediate products are formed which may require still other species to continue the process (ZoBell, 1969). Unfortunately, the most readily attacked fraction of crude oil — the normal paraffins — is the least toxic one. The toxic aromatic hydrocarbons, especially the carcinogenic polynuclear aromatics, are not rapidly attacked.

The fact that coastal waters are not devoid of marine life even after decades of oil contamination indicates that the sea is capable of recovery from this type of pollution. But the fact remains that once the recovery capacity of an environment is exceeded, deterioration can be rapid and catastrophic; and we do not know how much oil pollution the ocean can accept and still recover.

Although accidental oil spills are spectacular events and attract great public attention, they are responsible for only about 10 percent of the total amount of oil entering the marine environment. The remaining 90 percent of the oil contamination originates in the normal operation of oil-carrying tankers, merchant and naval vessels, offshore production, refinery operations, and the disposal of oil-waste materials. Table III-3 shows the contributions from these various sources for 1969 and estimates of the amounts which may be expected in 1975 and 1980.

Two sources of oil contamination of the sea are not listed in this table: the natural seepage of oil from underwater oil reservoirs and the transport of oil in the atmosphere and its precipitation on the sea surface. The seepage source is probably small compared to the direct input to the ocean, but atmospheric transport, which includes evaporated hydrocarbons and those emitted by engines after incomplete combustion, may be greater than the direct input.

Tankers flushing oil tanks at sea

After discharging their oil, tankers sail with seawater ballast to maintain stability and manoeuvrability at sea. It has been customary to discharge this ballast water at sea and to clean the tanks before entering the port of loading. The eastern Mediterranean was heavily polluted with oil before the closing of the Suez Canal because of this practice. By international agreement [4] some regulations have been adopted to reduce this form of pollution (including the discharge of ballast and cleaning of tanks, which are supposed to take place at least 50 miles from shore), but the present methods of monitoring and surveillance are inadequate.

A shown in Table III-3, normal tanker operations added 530 000 tons of oil to the sea in 1969. The introduction of the process known as " load on top " (LOT), by which more than 98 percent of the oil which would otherwise be released to the sea can be recovered, has drastically reduced the amount of deliberately discharged oil. Without this method, which is used by about 80 percent of tankers operating at present throughout the world, the contamination of the sea would be about five times greater than is is today.

The projections for 1975 and 1980 in Table III-3 show minimum values based on the assumption that all tankers are converted to the LOT control procedure, and the maximum value is based on the assumption that the ratio remains the same as it is today. This one control method, if used consistently, can do much toward avoiding excessive contamination of the ocean by oil.

TABLE III-3. – ESTIMATED DIRECT PETROLEUM HYDROCARBON LOSSES TO THE MARINE ENVIRONMENT
(NOT INCLUDING AIRBORNE HYDROCARBONS DEPOSITED ON THE SEA SURFACE)

	1969	1975 (estimate)		1980 (estimate)	
		(minimum)	(maximum)	(minimum)	(maximum)
	..... *Million tons*				
Tankers	0.530	0.056	0.805	0.075	1.062
Other ships	0.500	0.705	0.705	0.940	0.940
Offshore production	0.100	0.160	0.320	0.230	0.460
Refinery operations	0.300	0.200	0.450	0.440	0.650
Oil wastes	0.550	0.825	0.825	1.200	1.200
Accidental spills	0.200	0.300	0.300	0.440	0.440
TOTAL	2.180	2.246	3.405	3.325	4.752
Total crude oil production	1 820	2 700		4 000	

SOURCE: STUDY OF CRITICAL ENVIRONMENTAL PROBLEMS. *Man's impact on the global environment.* Cambridge, Mass., M.I.T. Press. 319 p.

[4] The International Convention for the Prevention of the Pollution of the Sea by Oil, 1954.

Other ships

The estimate of oil contributed by cargo ships other than tankers is of low reliability because the data available are inadequate for a more precise evaluation. Some cargo ships also use seawater ballast at times and all ships pump bilges which are inevitably contaminated with oil. A considerable amount of oil may enter the ocean from this source.

Offshore oil production

There are losses of oil from offshore oil rigs, exclusive of those produced by blowouts. Offshore production of oil under normal operating conditions may contribute 100 000 tons of oil pollution to the oceans. At present, offshore production accounts for about 16 percent of total crude oil production. The minimum estimate for 1975 and 1980 in Table III-3 is based on the assumption that this percentage will remain constant; the maximum estimate assumes it will double. The percentage may be expected to increase in the future as new underwater fields are discovered and new technology permits extension of drilling and production into deeper water. It seems probable that improved technology and more rigorous application of existing control measures could maintain this source of oil pollution at a minimum.

Refinery operations

Normal refinery operations contributed 300 000 tons of oil to the oceans in 1969. This includes wastes from the petrochemical production industry. The minimum estimates for 1975 and 1980 are based on the assumption that some improved control measures can be developed, whereas the maximum estimates assume essentially no improvement and increased use of oil.

Automotive and industrial oil wastes

Between 500 000 and 1 million tons of automotive lubricants are annually disposed of as wastes, and an additional 1 million tons of waste oil are generated by industry. Very little is known about the degree to which the disposal of these waste oils contributes to marine pollution, since much of the disposal of these wastes occurs by dumping on land. The estimate in Table III-3 for 1969 is based on the oil content of river waters entering the sea, which would contribute, on a global basis, about 450 000 tons. An additional 100 000 tons are contributed to the ocean by municipal sewage effluents.

Accidental spills

Accidental spills account for less than 10 percent of the annual oil pollution of the oceans. About half of this contribution is from accidents to ships and half from accidental blowouts of offshore oil wells. A partial listing of accidental spills in recent years is given in Table III-4.

The increasing size of tankers provides additional cause for concern about the possibility of shipwrecks and collisions. Tankers of 500 000 deadweight tons will soon be constructed and 800 000-ton vessels are planned. A wreck of one of these supertankers would make the 118 000 tons of oil released from the *Torrey Canyon* seem small. The cargo of a supertanker is equivalent to about 20 percent of the amount of petroleum entering the ocean in a single year. The draught of these large ships will prevent them from entering many existing harbours. Offshore loading and unloading facilities with submarine pipelines leading to shore will be required, and this raises the possibility of additional contamination. Since the closure of the Suez Canal the traffic of tankers coming from the Near East increased considerably around Africa and this may increase the risk of accidental spills in this part of the world.

The "blowouts" from offshore oil drilling and production at present account for a small fraction of the total influx of oil to the ocean. The Santa Barbara blowout, for example, released only about 10 000 tons of oil and the blowout of the producing well in the Gulf of Mexico released only about 4 000 tons. Technology is available to prevent such blowouts and avoiding them merely requires that certain precautions are applied; but the risk of accidents of this kind still exists.

Natural oil seepages occur off the coasts of Louisiana, Texas, Trinidad, Mexico, Cuba, California, in the Persian Gulf and perhaps in other offshore areas having submarine oil deposits. It appears, however, that the amount of natural seepage into the ocean accounts for only a small percentage of the present-day contamination produced as a result of man's petroleum-connected activities.

Some of these sources of oil pollution can be controlled more rigorously. Controls which would be adequate to reduce the amount of petroleum hydrocarbons entering the sea are difficult to visualize for two reasons: present technology is based on the continued and increased use of petroleum, and production of oil from submarine reservoirs and sea transport of oil will increase. The world production of crude oil in 1969 was nearly 2 000 million tons, of which somewhat over 0.1 percent was lost to the sea. Some losses in the exploitation, transportation and use of a natural resource may be inevitable, but if this loss ratio cannot be drastically improved, the oil pollution of the ocean will increase as our utilization increases.

TABLE III-4. – SOME OIL SPILLS AS A RESULT OF TANKER WRECKS AND COLLISIONS

Date	Vessel	Location	Amount	Type of oil
18 September 1969	*Gironde*	St. Brieuc, France	1 500 tons	Fuel oil
16 September 1969	*Florida*	West Falmouth, U.S.A.	10 000 gal. (38 000 l)	No. 2 fuel oil
4 February 1970	*Arrow*	Nova Scotia, Canada	16 000 tons [1]	Bunker C
13 February 1970	*Delian Apollon*	Tampa Bay, Florida, U.S.A.	10 000 gal. (38 000 l)	"Oil"
5 March 1970	*Ocean Grandeur*	Torres Straits, Australia	55 000 tons [1]	Crude
20 March 1970	*Othello* *Katelysia*	Tralhavet Bay, Sweden	60-100 000 tons	Bunker C
5 May 1970	*Polycommander*	Vigo, Spain	10 000 tons	Light crude
23 October 1970	*Kasamatsu Maru*	Off Japan	375 000 gal. (1 420 000 l)	Gasoline
23 October 1970	*Pacific Glory* *Allegro*	Isle of Wight, U.K.	27 000 tons	Crude oil
27 December 1970	*Oregon Standard* *Arizona Standard*	San Francisco Bay, Cal., U.S.A.	1.5-1.9 million gal. (5.7-7.2 million l)	Bunker C
23 January 1971	*Esso Gettysburg*	New Haven, Conn., U.S.A.	386 000 gal. (1.46 million l)	No. 2 fuel oil
27 February 1971	*Wafra*	Cape Agulhas, S. Africa	64 000 tons	Crude oil
14 March 1971	*Thuntank 6*	Milford Haven, Wales, U.K.	151.9 tons	Fuel oil

Data from Smithsonian Institution, Center for Short-lived Phenomena.
[1] Capacity of vessel; amount released unknown. Other entries are estimated amount of oil released.

Other organic wastes

There are several thousand types of organic chemicals produced by industry or as a by-product in industrial processes. The petrochemical industry is highly diversified and its wastes contain both organic and inorganic (e.g., heavy metals, acids, chlorine) materials. Some of the former cause spoilage of flavour of marine products, and some are carcinogenic and may accumulate in the marine products and thus be transmitted to man. Another danger exists in the shipping of petrochemicals either as final products — for example, organic solvents — or products for further chemical processing.

A variety of other organic compounds occurs in the waste material from such industries as pulp and paper production. A wide variety of problems can arise from the release of these materials into the aquatic environment. Water for municipal systems may be made unfit for human consumption; fish and other aquatic life may be killed; waters in streams or around beaches may be contaminated by oil, sticky, coloured or malodorous materials and become unfit for recreational purposes; obnoxious odours or vapours may evolve from polluted waters to contaminate the atmosphere in areas nearby. If these organic materials are decomposed by aquatic bacteria, they will have a biochemical oxygen demand, just as untreated sewage has, and may render the water anoxic, producing dangerous gases such as hydrogen sulphide and methane which will kill most of the aquatic life in the area.

A general system for rating chemicals on the basis of toxicity to human beings and to aquatic life, and their effects on aesthetics is presented in Table III-5. For each chemical considered, the grade may be different for each of the three criteria used: for example, a water-soluble, tasteless, odourless chemical may be highly toxic to aquatic life, but have no effect on aesthetics. Such a chemical released in fresh water could be dangerous for human consumption, but the same material released in sea water would be relatively unimportant for human toxicity because the sea is not a source of potable water.

One serious problem in the attempt to rate chemicals in such a scheme is that the effect of many chemicals on aquatic life is unknown; also, hundreds of new chemicals are produced annually, making the task of evaluation enormous. A possible method of simplifying this vast programme of investigation would be to place the burden of proof of nontoxicity on those responsible for the pollutant.

Inorganic wastes

A large number of inorganic chemicals are added to the aquatic environment as waste products. These chemicals range from innocuous to highly toxic, and in some cases the effect on fresh-water systems differs greatly from that on the marine environment. The addition of acids and bases, which are common waste products of many industrial processes, to fresh water can have a profound effect, as many organisms are very sensitive to the acidity or alkalinity of the water in which they live. Sea water, because of the particular salts it contains, is able to neutralize acids and alkalis, thus diminishing their effect on the marine environment. Other elements already abundant in sea water will have minor effects when additional quantities are added, but may have a major effect when introduced to fresh water. Elements in this category are sodium, chlorine, potassium, calcium, magnesium, and sulphate ions. Additions of elements such as these to sea water would make a small percentage change in the concentration and would not affect the biology of the system; but the same concentration added to fresh water could have serious effects.

All of the elements present in the soils and rocks on earth are constantly being eroded and added to

Table III-5. – Outline of rating system for water-pollution effects of organic wastes

Grade	Human toxicity	Aquatic toxicity	Aesthetic effect
0	Nontoxic: LD_{50} 15 g/kg	Acute threshold limits above 10 000 ppm	No significant pollution: gases and odourless liquids
1	Practically nontoxic: LD_{50} 5-15 g/kg	Threshold limits 1 000-10 000 ppm	Mild-odoured light oils and soluble chemicals
2	Slightly toxic: LD_{50} 0.5 to 5 g/kg	Threshold limits 100-1 000 ppm	Mild-odoured oils: boiling point 65.6°-169°C
3	Moderately toxic: LD_{50} 50-500 mg/kg	Threshold limits 1-100 ppm	Light coloured high-boiling oils: odorous water-soluble compounds
4	Toxic chemicals: $LD_{50} < 50$ mg/kg	Threshold limits below 1 ppm	Heavy oils. coloured or malodorous

Source: IMCO/FAO/Unesco/WMO Group of Experts on the Scientific Aspects of Marine Pollution, *Report of the First Session (London. 17-21 March 1969)*. Annex V, p. 5.

TABLE III-6. – MAN-INDUCED RATES OF MOBILIZATION OF MATERIALS WHICH EXCEED GEOLOGICAL RATES AS ESTIMATED IN ANNUAL RIVER DISCHARGES TO THE OCEANS

Element	Geological rates [1] (in rivers)	Man-induced rates [2] (mining) [3]
	Thousand metric tons per year	
Iron	25 000	319 000
Nitrogen	8 500	[4] 9 800
Manganese	440	1 600
Copper	375	4 460
Zinc	370	3 930
Nickel	300	358
Lead	180	2 330
Phosphorus	180	[4] 6 500
Molybdenum	13	57
Silver	5	7
Mercury	3	7
Tin	1.5	166
Antimony	1.3	40

SOURCE: *Study of Critical Environmental Problems* (1970).
[1] Bowen, 1966. – [2] United Nations, *Statistical Yearbook*. – [3] 1967 data for mining except where noted. – [4] Consumption.

the aquatic system by natural geological processes. In many areas of the world man has increased this rate of erosion by faulty agriculture and forestry, but even in virgin territories rivers constantly carry a wide variety of elements to the sea. When man's activities are small relative to these geological rates and processes, it can be assumed that his contribution to the pollution of the aquatic system is minor; but in some cases it is clear that man-induced rates of mobilization of minerals are equal to or greater than the natural rates and that his activities are greatly accelerating the normal processes. The data in Table III-6 show 13 elements for which the man-induced rates of mobilization are greater than geological rates.

The biological effects of the fertilizing elements nitrogen and phosphorus have been discussed above. Iron, which shows the greatest man-induced rates in this table, is a relatively nontoxic material and has had little impact upon the biology of marine and fresh-water systems. The huge amount of iron entering the oceans from the rivers is an indication of the wastefulness of our utilization of this important material.

The remaining elements in the table are toxic to some degree. The most important in terms of their impact upon the natural biological systems of the aquatic environment are mercury, copper, lead, cadmium, chromium, zinc, nickel and arsenic. The world production of some of these toxic metals and their utilization in the United States are presented in Table III-7.

It is clear that world production of these elements is increasing and in the course of time they will be carried to the sea.

As yet there is no clear evidence of any drastic effect of most of these elements on the aquatic environment, except for localized incidents of heavy pollution. Mercury, however, is highly toxic to both humans and aquatic life and has become widely distributed in the environment. It is discussed below as an example of the threat which toxic materials can be to the natural biological system and to fisheries.

Like other toxic heavy metals, mercury is accumulated in the bodies of organisms, where it remains

TABLE III-7. – WORLD PRODUCTION [1] AND UNITED STATES CONSUMPTION [2] OF SOME TOXIC HEAVY METALS

Year	Hg Mercury		Cd Cadmium		Pb Lead		Cr Chromium		Ni Nickel	
	World	U.S.	World	U.S.	World	U.S.	World	U.S.	World	U.S.
	Thousand metric tons									
1960	—	1.77	—	4.53	—	930	—	1 110	—	98.2
1961	—	1.92	—	4.65	—	932	—	1 090	—	108
1962	—	2.26	—	5.56	—	1 010	—	1 030	—	108
1963	8.28	2.70	11.8	5.19	2 520	1 060	3 920	1 080	340	114
1964	8.81	2.81	12.7	4.31	2 520	1 090	4 150	1 320	372	134
1965	9.24	2.54	11.9	4.75	2 700	1 130	4 810	1 440	425	156
1966	9.51	2.46	13.0	6.60	2 860	1 200	4 390	1 330	414	171
1967	8.36	2.40	12.9	5.28	2 880	1 150	4 300	1 230	441	158
1968	8.81	2.60	14.1	6.05	3 000	1 200	4 730	1 200	480	[3]144

SOURCE: *Study of Critical Environmental Problems* (1970).
[1] 1963 data are from the *Minerals Yearbook*, 1967; 1964-68 data are from the *Minerals Yearbook*, 1968. – [2] *Chemical Economic Handbook*, 1969. – [3] *Minerals Yearbook*, 1968.

for long periods of time and functions as an accumulative poison. It is used in many industrial processes and can be transported to the aquatic environment either when it is discharged as an effluent waste material or carried through the atmosphere. Metallic mercury has a high vapour pressure at room temperature and constantly emits vapour into the air; furthermore, any activity (such as mining and the refining process) which heats mercury or its compounds also emits mercury vapour. Mercury compounds are used as pesticides, especially for fungus control in agriculture and until recently were used for the control of slimes in the pulp and paper industry. It is also used as a toxic element in antifouling paints, from which it can leach directly into the sea.

Although inorganic salts of mercury are toxic, some organic compounds of mercury are even more so. Through bacteriological activity, mercury in the aquatic environment is converted to methyl mercury, which can be accumulated by fish or shellfish and is extremely toxic to humans. In Japan, 111 cases of mercury poisoning occurred (with 41 deaths) as a result of eating fish and shellfish taken from Minamata Bay which was contaminated by effluents from an industrial plant (Irukayama, 1967).

Several lakes in Sweden and a few coastal regions in the Baltic have become so contaminated with mercury that sale of fish caught in them has been prohibited. In the spring of 1970 the Canadian part of Lake St. Claire was closed to fishing because of excessive mercury content of the fish. Later, parts of Lake Erie were found to be so contaminated that fishing for certain species was also prohibited there. Since that time it has been demonstrated that some fish and waters in 20 states of the United States are contaminated with mercury. The United States Food and Drug Administration is carrying out a nationwide investigation in the attempt to identify and eliminate mercury contamination of freshwater fish. In the meantime, the authorities guarantee that freshwater fish released to the market is perfectly safe and wholesome. But the high concentrations found in certain ocean fish such as tuna and swordfish have adversely affected the market situation and economy of fisheries.

Mercury, as all other heavy metals, is a valuable natural resource. In industrial use it can in many cases be recovered and recycled at a high level of efficiency, but its use as a fungicide and for the treatment of seeds does not permit its later recovery and reuse, and this has led some countries to restrict its utilization.

Lead is another example of heavy-metal toxic material that has become widely distributed in the global environment. Tetraethyl lead has been added to gasoline for several decades in order to improve its " anti-knock " performance in automobile engines. The lead, emitted into the atmosphere as the gasoline is burned, has demonstrably affected the growth of plants near roads with intensive traffic. Like all other atmospherically transported pollutants, it can be carried to great distances from the source and deposited either in particulate form or washed out in rain upon the sea surface. Its concentration in the surface waters of the sea has been shown to be in excess of the normally expected concentration and in excess of the concentration in deep waters. High lead concentrations are commonly found in bottom sediments near population centres.

Specific ecological effects of lead, copper and zinc have been described. The other toxic heavy metals are also potentially dangerous in the environment. Even though they have not yet the dramatic impact of mercury pollution, they cannot be ignored.

Radioactive materials

The problem of contamination of the aquatic environment by radioactive materials is of a special and very complex type. Radioactivity may pose serious pollution problems, as radioactive isotopes can produce not only immediate effects on living organisms, but, even more important, can produce mutations in the genetic material which would have serious consequences for later generations. Civil uses of nuclear energy are strictly controlled in order to minimize the possible risks to public health or damage to aquatic resources; but increasing demands for electrical energy will lead to the greater use of nuclear power in the future and the problems of the disposal of radioactive wastes will require increased attention.

Radioactivity can reach the aquatic environment from a variety of sources — some subject to rigorous control and others accidental and difficult to predict and control. Because of the great hazards involved, the development of atomic energy must continue to be carefully monitored and regulated.

Fallout

During the period in which atmospheric testing of nuclear weapons was being carried out vigorously, the atmospheric and marine concentration of radionucleides rose progressively. The subsequent ban on atmospheric testing by most of the nuclear powers brought about a gradual decline in the quantity of radioactive materials in the atmosphere and the sea, through radioactive decay and by deposition in bottom sediments.

When nuclear weapons are exploded in the atmosphere, the radioactive debris can be introduced at very high levels and achieve a global distribution in a relatively short time. The larger particles return

quickly within a few kilometres of the source as fallout, but the finer materials can be transported around the earth and can remain airborne for several years. As a result of early weapons testing, radioactivity can be detected in all ground and surface waters of the world. Except in localities adjacent to the bomb tests, there have been no serious effects on the biology of fisheries resources of the sea because of this activity.

Nuclear-powered ships and submarines

Nuclear-powered ships and submarines are carefully designed to avoid radioactive contamination of the environment. So long as adequate precautionary methods are followed there is no apparent danger of radioactive contamination from this source.

Nuclear power plants

The anticipated increase in the use of nuclear energy for the production of power will carry with it an inevitable increase in the amount of radioactive wastes. Within the next few decades large volumes of high-level radioactive wastes will be accumulated and must be disposed of in a way which will not endanger the environment.

These high-level wastes are produced in fuel-processing plants in which waste fission products are separated from the unfissioned uranium, which then can be reused. In general, high radioactivity liquid wastes are stored in large concrete or steel tanks at sites of production and are not released into the environment. In the course of time, these elements will revert to nonradioactive isotopes by natural radioactive decay. To prevent undue contamination of the environment, however, the storage must be safe for centuries since the half-life of the critical elements in a fission product mixture is measured in terms of decades. For example, the half-life of strontium 90 is 27.7 years, and that of tritium is 12.3 years.

Low-level wastes are also produced as a result of the application of nuclear energy. Maximum permissible release rates have been set for drinking water; these depend not only on the type of radiation for the element but also on the way in which the element is stored or excreted by the human body. As long as low-level wastes meet these drinking-water standards, they are commonly released directly into the environment, the assumption being that as long as the level of radioactivity is deemed safe for human consumption, it will have no adverse biological effects in the environment. Some of the radioactive elements can be reconcentrated either by adsorption on sedimentary materials or by absorption by the biological system. Some of the biological concentration factors can be in the thousands, even in the hundreds of thousands. Additional studies are needed in the aquatic environment to determine whether, in fact, the maximum permissible concentrations for drinking water constitute a real safeguard of the aquatic ecosystem.

Other sources

Other sources of radioactive pollution of the aquatic environment include laboratory experiments with, and medical uses of, radioisotopes. The level of radioactivity in these uses is vigorously controlled to protect the individuals exposed to the radioactivity. Waste liquids produced in this way are generally low enough in concentration to be disposed of in the sewage system. Contaminated solid materials such as laboratory glassware have been encased in weighted drums and disposed of at sea. The most common treatment of this solid waste material at present is to bury it on land in specified radioactive-waste disposal sites.

Whenever radioactive wastes are released into the environment, continuous monitoring should evaluate the buildup of radioactivity. The monitoring should emphasize analysis of organisms and sediments, as it is in this part of the ecosystem that accumulation can be expected. So far, however, control of radioactive pollution of the environment has maintained concentrations low enough so that no adverse effects in the aquatic biota have been found, except for the immediate environs of nuclear weapons tests and an occasional accidental release of radioactive material. Considering the degree of potential danger of radioactive contamination of the environment, as the world develops additional nuclear power plants these controls should be strictly maintained through international agreements.

Waste heat

Waste heat is a by-product of many industrial processes, especially from the production of electrical energy. Most of the thermal energy utilized is dispersed into the atmosphere, and this includes much of the waste heat from power plants. The heat used in internal combustion engines and in heating houses and commercial establishments is all released into the atmosphere; but some, produced in air conditioning, in industry and in power plants, is released to the aquatic environment.

The use of fossil fuels for all purposes has been expanding at a rate considerably greater than the rate of growth of the human population. Table III-8 shows the world production of fossil fuels from 1950 to 1967. The total tonnage of fuels produced during this period has more than doubled, with

TABLE III-8. – WORLD PRODUCTION OF FOSSIL FUELS, 1950-67

Year	Coal	Lignite [1]	Refined oil fuel [2]	Natural gas [3]
	Million metric tons			
1950	1 340	530	445	155
1951	1 375	550	530	180
1952	1 375	550	585	200
1953	1 380	555	605	210
1954	1 375	550	635	220
1955	1 500	630	705	240
1956	1 595	665	770	260
1957	1 625	765	795	285
1958	1 665	825	830	305
1959	1 730	845	900	345
1960	1 810	875	970	375
1961	1 625	905	1 030	405
1962	1 675	905	1 115	440
1963	1 740	965	1 210	480
1964	1 800	1 005	1 315	525
1965	1 815	1 030	1 410	565
1966	1 845	1 050	1 525	610
1967	1 750	1 040	1 630	655

SOURCE: *Study of critical environmental problems*, 1970 (from United Nations, *World energy supplies*).

[1] After 1962, lignite production figures were given in metric tons coal equivalent. For 1960, 1961, and 1962 (the only years for which there is overlapping data), the apparent conversion factor is 1 metric ton lignite = 0.44 metric ton coal equivalent. This same factor was used in the later data.

[2] Includes natural gasoline.

[3] Assumed density of 8×10^{-4} g cm^{-3} (1 000 m^3 = 0.8 metric ton) (President's Science Advisory Committee (PSAC), 1965).

large increases in the production of all types of fossil fuel except coal, which has remained fairly constant.

The United Nations, in its statistical report on world energy supplies, has estimated that between 1970 and 1980 world thermal waste energy will nearly double and will increase almost sixfold between 1970 and 2000.

In many ways, waste heat is a unique type of pollutant. Seasonal temperature variations are characteristic of any aquatic environment. Also, the amount of heat reaching the earth from the sun far exceeds the amount man produces by burning fuels or in nuclear power plants. However, ranges of normal temperature fluctuations in the aquatic environment differ greatly from one region to another. In the oceans, fluctuations are least in the equatorial regions and in the arctic regions and greatest in the mid-latitudes.

Organisms adapted to these natural fluctuations have developed and frequently the distribution of species is closely correlated with the temperature characteristics of the water.

The disposal of waste heat to the aquatic environment has not as yet been a serious problem except in a few very localized areas. In passing through a power plant, the water used for cooling may be warmed 15°C above the ambient temperature at the intake. Since this water is warmer than the environment into which it is discharged, it is less dense than the receiving waters and spreads out as a plume at or near the surface. The excess heat is dissipated by mixing with the surrounding water mass and by exchange with the atmosphere, primarily through the evaporation of the surface water film.

Alabaster (1963) has pointed out that the summer temperature of normal, relatively unpolluted river water was raised by as much as the range from 6.3 to 10.4°C at six different thermoelectric stations in the United Kingdom; the temperatures of the rivers downstream of course depended on the distance from the heated effluent outfall and on the degree of mixing.

Nuclear power plants may be expected to supply an increasing amount of electrical energy in the future. This has two important connotations for aquatic pollution by waste heat. In the first place, in their present stage of development nuclear power plants are less efficient than the fossil fuel plants; thus, for a given unit of energy they produce more waste heat. In the second place, in order to be economical they must be comparatively large and they therefore require larger volumes of cooling water. Because of this large demand for cooling water, many of the proposed nuclear power plants are being built on lakes, estuaries and coastal regions. It is estimated that world energy consumption will double in the next decade and nuclear production of energy is expected to increase fifteen times (*Study of Critical Environmental Problems*, 1970, p. 294-295).

Although waste heat has not as yet caused serious problems in the aquatic environment, there is no reason for complacency if the projections for future demands for energy are to be met. Disposal of the waste heat produced by meeting the increased world demands for energy may create problems which we are not faced with today. For instance, it is not known how much waste heat will be dissipated directly to the atmosphere by means of cooling towers and how much will be added to the aquatic environment. Protection of living resources of the aquatic environment may force more and more atmospheric disposal; but this will in turn produce additional problems (which are beyond the scope of the present discussion).

The problems accompanying the disposal of waste heat to the aquatic environment differ depending upon the characteristics of the environment which is being used. In tropical environments many organisms live at or near the upper temperature limit, either for survival or for breeding. Organisms living near their upper limits of temperature tolerance can be adversely affected by even a small change in the temperature of the water. In temperate waters the disposal of waste heat in winter can upset the reproductive cycle of organisms which generally breed

only during spring with the slow rise of temperature, causing spawning and production of larvae during a period of low food production. This can only result in a loss of reproductive potential. During summer the temperatures may rise to lethal limits, as in the tropics.

There are a number of ways in which waste heat could be used for beneficial purposes. These will be discussed below.

Solid wastes

The disposal of solid wastes (a mixture of commercial and household rubbish such as paper, bottles, cans, etc.) has become one of the most urgent and difficult problems of the crowded urban centres of developed countries, and sea disposal of this waste material is being used increasingly. The automobile is also a source of considerable solid waste. During the life of a car several sets of tires may be worn out and discarded and eventually the automobile itself is junked. Efforts are being made to develop methods of recycling the valuable materials in automobiles, but as yet the process is far from complete. Other types of solid waste are the sludge produced in sewage treatment plants, which is already being dumped at sea in certain localities, and the spoils from the dredging of harbours, which are either used as a land fill along the shore or dumped in the ocean. Building rubble and stone are mostly used for land fill, but some of them are also finding their way into the sea. The impact of the disposal of these different materials into the sea will range from innocuous to damaging (see below).

The amount of household and commercial rubbish to be disposed of varies greatly throughout the world. In the United States, the present rate of production of this type of rubbish is about 2.2 kilogrammes per caput per day, and, with an increase in population, is expected to increase to 3.4 kilogrammes per caput per day by the end of the present decade. This is about 50 times as much waste as is produced per caput in India. Throughout most of the world this type of material is now being used as land-fill, but land for this purpose is rapidly becoming less available and more expensive.

In some countries proposals have been made to collect and bale household and commercial waste for transportation to the sea, where it would be dumped in waters 1 000 metres deep or more. It will be necessary for the bales to be compacted to a density greater than seawater so that they will sink and no loose floatable objects are released in the process of dumping. Among the suggestions are that the bale be wrapped in plastic to avoid any leaching of materials.

It has been shown by Jannasch (1971) that the rate of decomposition of organic material at the high pressure and low temperature of the deep sea is very much slower than it would be at the same temperature, but at atmospheric pressure. The organisms in the deep sea have evolved in an extremely constant environment and they are, therefore, not adapted to the unusual stresses which confront organisms in more variable situations.

The ecological effects of such waste disposal are still entirely unknown and should be investigated before extensive dumping is undertaken.

The disposal of old automobiles and tires at sea has been done so far largely on an experimental basis in an effort to determine whether artificial reefs can be created which will improve fishing. There is evidence that fish catches have increased, but it is not yet certain whether this represents an aggregation of fishes already in the area or an actual increase in the productivity of the fishery.

Where the sewage sludge of some large cities has been regularly dumped in the same defined areas, it has been observed that normal bottom populations have been eliminated or heavily affected, both in abundance and composition (Pearce, 1970).

Laboratory tests have shown that sludge deposits can cause necrosis of the shells of lobsters and crabs and tend, to clog their gills, so that survival of the species in contact with the sludge deposits is very brief.

Many problems related to this operation require further investigation. It is not known, for example, how much of the material being dumped is accumulating and how much is being decomposed. Because the marine environment has a tremendous capacity to recover from abuse, it is possible that during the early years of such dumping operations the sludges were being decomposed and made innocuous by the normal biological processes; but when the rate of delivery of organic waste materials to an aquatic environment exceeds the capacity of the environment to recover, the rate of deterioration can be rapid and sometimes irreversible.

Dredging spoils collected in polluted harbours can be as disastrous in ecological effect on the bottom populations as sewage sludge.

The possibility of recovering sand, gravel and minerals from the deep sea is being investigated. Sand, gravel and oil are now being recovered in the shallower waters of the continental shelf. If deep sea mining becomes a reality, it will certainly produce particulate waste materials which would be suspended in the water for an indeterminate period of time; when these particles settle on the bottom in quantities, they could smother bottom populations, even if the waste is nontoxic. Any sediment introduced into tropical reef areas could be particu-

larly disastrous because many reef organisms are especially sensitive to increased sedimentation. These are not yet pollution problems, but the effects on the environment of mining operations at sea should be considered in developing plans.

For a variety of reasons, waste disposal operations at sea should be considered a temporary and interim solution to the disposal problem. In the cases of garbage, sewage sludge and dredging spoils, where ecological damage has already been clearly demonstrated, alternative methods of disposal should be searched for and used. Our use of the deep sea may be very different a generation from now than it is today, and — as with all our natural resources — it should be preserved for future generations.

Effects of pollutants on fisheries

Various comments have been made in the preceding sections about the effects of specific pollutants on living aquatic resources. In most cases, however, we do not have adequate information to assess the total biological effects. If severe damage occurs, as in the eutrophication of a lake or mass mortality of fish, the effects are self evident. Pollution is, however, an insidious process which may continue for years with no apparent effects until the rate of discharge exceeds the capacity of the system to recover. The purpose of this section is to discuss briefly the kind of information needed in order to assess the effects of pollution on fisheries resources.

Biological effects

The acute toxicity of a pollutant is generally evaluated by means of a bioassay test which determines the concentration required to kill one half of the test organisms in a given period of time. As different organisms have different degrees of resistance to a particular toxic material, the selection of the test organism has a bearing on the interpretation of the results of bioassays. Ideally, the species is used which should be protected in the environment, either because of its own economic value or because of its value as a food supply for other species of economic value.

One of the great advantages of the bioassay is that it measures the total effect of the pollutant (which may be a mixture of many compounds) on the organism. Synergistic, or antagonistic, effects among various compounds should be evaluated. It is thus possible to measure the total effect without necessarily knowing which constituents or combinations of the waste material are the causes of the toxicity.

When the results of a bioassay are available, the permissible levels of concentration are generally set at a fraction (commonly 1 to 10 percent) of the concentration found to kill 50 percent of the individuals in the test in a fixed short period of time, usually 48 or 96 hours.

In the bioassay test for acute toxicity many biological effects of pollution may not appear — those which are slow to develop or to produce a general debility which might interfere with some of the normal life functions of the organism, rather than killing it directly. As long-term exposure to sublethal concentrations may be necessary to produce such effects, evaluation of this type of action is difficult in a laboratory analysis. There are many ways in which pollutants might affect a given population without being lethal to the adult organism used in the test:

a) Migrations

Sublethal concentrations may interfere with the normal migration patterns of organisms. The mechanisms used for orientation and navigation by migrating organisms are not well known, but in some cases chemotaxis clearly plays an important role. Salmon and many other anadromous fishes have been excluded from their home streams by pollution, though it is not known whether the reason is that a chemical cue has been masked or because the general chemical environment of pollution is offensive to the fish.

b) Behaviour

Much of the day-to-day behaviour of a species may also be mediated by means of chemotaxic responses. The finding and capture of food and the search for a mate during the breeding season are included in this category of activity, and again, any pollutant interfering with the chemoreceptors of the organism would interfere with the behavioural patterns essential to the survival of the population.

c) Incidence of disease

Long-term exposure to sublethal concentrations of pollutants may make an organism more susceptible to a disease. It is also possible that some organic pollutants may provide an environment suitable for the development of disease-producing bacteria or viruses. In such cases, even though the pollutant is not directly toxic to the adult organism it could still have a profound effect on the population of the species over a longer period of time.

d) Life cycle

The larval forms of many species of organisms are much more sensitive to pollution than are

the adults which are commonly used in the bioassay. In many aquatic species millions of eggs are produced and fertilized, but only two of the larvae produced need grow to maturity and breed in order to maintain the standing stock of the species. For these species, the pre-adult mortality rate is enormous even under the best of natural conditions. An additional stress on the developing organisms might cause failure of enough individuals to survive and maintain the population of the species. Interrupting any stage of the life cycle can be as disastrous for the population as death of the adults from acute toxicity of the environment.

e) Physiological processes

Interference with various physiological processes, without necessarily causing death in a bioassay test, may also interfere with the survival of a species. DDT depresses photosynthesis in planktonic algae, but only at concentrations greater than its solubility in water. No direct effects of this potential inhibition have been observed in the field.

Respiration might also be adversely affected, as could various other enzymatic processes by sublethal concentrations of pollutants. The effect of DDT and its decomposition products on the shells of bird eggs is probably the result of interference with enzyme systems. Mercury is a general protoplasmic poison, but has its most damaging effect on the nervous system. In humans this is known to be serious and similar observations exist for marine mammals (e.g., seals). How it affects fish and other aquatic organisms in sublethal concentrations is still unknown.

f) Nutrition and food chains

Pollutants may interfere with the nutrition of organisms by affecting their ability to find prey, by interfering with digestion or assimilation of food, by contaminating the prey species so that it is not accepted by the predator. On the other hand, if predator species are eliminated by pollution the prey species may have an improved chance of survival. An example of the latter effect was shown in the kelp resurgence after the oil spill in Tampico Bay, California (North, 1967). The oil killed the sea urchins which used young, newly developing kelp as food and the kelp beds developed luxurious growth within a few months.

g) Genetic effects

Many pollutants produce genetic effects which can have long-range significance for the survival of species. Radioactive contamination can cause mutations directly by the action of radiation on the genetic material. Oil and other organic pollutants may include both mutagenic and carcinogenic compounds. From genetic studies in general it is known that a large majority of mutations are detrimental to the survival of the young, and many are lethal. Little is known about the intensity or frequency of genetic effects of pollutants except for those caused by radioactive materials, in which the mutation rates have been measured.

Ecological effects

Effects of pollution on the aquatic ecosystem are the most difficult to establish and evaluate. Each environment is somewhat different, but the species inhabiting any given environment have evolved over long periods of time and each individual species in a community plays its own role. Any additional stress, whether natural or man-made, will tend to eliminate some species, leaving only the more resistant and tolerant forms to survive. The effect may be either direct on the species involved or indirect by the elimination of a food supply. For some of the species in the system the result may be beneficial, through the removal of predators or by stimulated and accelerated growth of their prey.

It is perfectly clear that man, through his numbers and his actions, is having increasingly pronounced effects on organisms, populations, and entire ecosystems. The process of eutrophication often happens sufficiently rapidly that everyone is aware that an ecological catastrophe has occurred. Through eutrophication, a system once aesthetically pleasing and economically valuable is transformed into something far less atractive or even malodorous and offensive. The effects of eutrophication, at least in freshwater systems (where it has happened frequently), are quite well understood at the ecosystem level; ecosystem effects of toxic materials have been less thoroughly studied.

Many people willingly accept the consequences of our advanced technology that are markedly deleterious to individual organisms, populations, and even, in some cases, to small inshore communities; but when an entire large ecosystem undergoes transformation most people become alarmed. How could man have unwittingly destroyed the great value of Lake Erie — an area over 400 kilometres long and 100 kilometres wide — as he has over the period of a few decades? Of course, it was not entirely unwittingly, since nearly a century ago biologists warned us of what was likely to happen to this lake. Only when society as a whole recognizes that a large-scale catastrophe has occurred due to

its own carelessness does it seek ways to manage its demands on ecosystems in such a way that they can be accommodated without triggering deleterious transformation. To provide answers we need theory at the ecosystem level of organization, as theory at the species and population levels, however refined, is too limited in scope to answer the questions that arise at the more highly organized levels of the ecosystem.

The study of the effects of pollution on ecosystems may be undertaken by considering pollution as an additional stress on the mechanisms that keep ecosystems organized. Unless the living parts of an ecosystem are already under marked external stress the early effects of the introduction of toxic pollutants will involve only the extinction of particularly susceptible species leaving the more resistant forms in a somewhat disorganized community. In communities already under stress, relatively low levels of pollution may cause them to break down or be transformed, with obvious unpleasant symptoms.

Estuaries and intertidal regions are naturally exposed to conditions of unusual stress; the ebb and flow of the tide and fluctuating fresh river water flow create changes in salinity on various time scales ranging from hourly to seasonally. In the intertidal zone the normal inhabitants are exposed to air when the tide falls; they are also subjected to vigorous wave action on exposed beaches and headlands. Unique assemblages of organisms, some of them of great economic value, like shrimps and oysters, have evolved and manage to survive these rigorous conditions if their surroundings remain unpolluted.

Pollutants are commonly released into aquatic ecosystems under conditions or in locations of high abiotic instability such as lakes, streams, estuaries, or intertidal zones; mangrove swamps and coral reefs, of great potential for aquaculture, are particularly vulnerable to such stress. Also, the rate of discharge usually varies considerably. The immediate effect of these conditions is that at any fixed point in the habitat the concentration of a pollutant varies markedly at times, but not in such a way that a community can adapt itself to the variations — for example, in the way that all temperate communities adapt themselves to pronounced seasonal phenomena. The result is that short-lived opportunists are likely to be favoured in areas subject to aquatic pollution.

Any single toxic substance may well be equally virulent toward long-lived or short-lived species in the normal aquatic community. Except where poisons near an outfall are always sufficiently concentrated to be lethal, as in continuous discharges in stable environments, they will act discontinuously through time. Where water mass instabilities are such that occurrence of poisonous concentrations averages once a week, it is possible for organisms with much shorter life spans to flourish briefly, with enormous population fluctuations. Where concentrations occur once a month, a community may evolve rapidly through a successional sequence involving a few longer-lived organisms before the next toxic flood destroys it again. Where lethal dosages are as infrequent as once a year, the succession may go to the stage of some fish of medium life span, particularly if migration into the area is relatively free. On the basis of this description it appears that the ecological community nearest an outfall should be most primitive from a successional viewpoint, and there should be a successional gradient or cline toward the usual climax community of an unpolluted environment, as distance from the outfall increases.

The effects of pollutants that are also effective plant nutrients are somewhat similar, though for different reasons. In situations in which nutrients enter the well-lit upper zone of deeper waters, the most opportunistic phytoplankters can become important components, at least periodically. Some of these, such as certain blue-green algae or red-tide organisms, are poisonous to fish and act to reduce diversity and stability by causing their death. Windrows of dead fish floating at the surface or on the beaches are a common result of red-tide outbreaks. Also, dense blooms of these opportunists can burst out at rates far outstripping the herbivorous zooplankton, but not the protozoan or bacterial decomposers. A combination of diurnal oxygen depletion due to phytoplankton respiration and/or decomposition by protozoans and bacteria can reduce oxygen to levels detrimental to fish, thus serving to drive the successional character of the community back to primitive stages.

The possible direct economic effects at the ecosystem level of pollution on a fishery thus become apparent: species that manage to survive the poisons or those that benefit from excessive plant nutrients tend to be small, short-lived, low-valued opportunists requiring sophisticated and costly technology for effective exploitation. The yield from an enriched body of water, in terms of weight, may be higher than in the original nonenriched waters but usually the value per kilogramme of fish harvested is much less than before, resulting in a net loss to the fisherman. If the waters become too enriched or toxic, yield also declines in terms of total production.

Possible beneficial effects

The ideal solution to aquatic pollution problems is to develop means whereby wastes can be recovered and reused or, in cases where disposal is essential,

to do so in a way in which it will improve the aquatic resources and environment. Waste products such as toxic heavy metals cannot be used for enrichment of the environment, and these must be removed from effluents at the source. It should, however, be possible to use nontoxic domestic sewage and waste heat for this purpose under favourable conditions. Experience in different parts of the world, although limited, has clearly demonstrated the feasibility and efficiency of the recycling and reuse of nontoxic pollutants.

Use of organic wastes for fish culture

Organic wastes (domestic sewage, wastes from food processing industries, etc.) can be treated biologically, as they constitute food for aquatic aerobic microorganisms which eventually become excess sludge and create serious disposal problems. However, it is possible to continue the food chain through fish culture systems: phytoplankton-zooplankton-bottom fauna-fish. In some countries use of treated or partially treated sewage for fish culture is a traditional practice and in others full-scale experiments (Allen, 1969 and 1970) have been conducted recently with very successful results, producing over one ton of fish per hectare per year without additional feeding or fertilization. Not only is this a form of utilization of wastes, but also an additional method of waste treatment in which organic matter is mineralized, nutrient content considerably reduced and a product of value to man produced.

Conventional biological methods of waste treatment depend on continuous operation. It is not possible to obtain full effectiveness in a treatment plant until about one month after the beginning of its operation. This creates a serious treatment problem for factories such as beet-sugar refineries in which production is seasonal. Recent experiments in Poland have, however, demonstrated that such organic wastes can be efficiently treated in fish ponds without any time lag, obtaining in addition a fish production of about 600 kilogrammes per hectare.

Major handicaps to the wider use of sewage for fish culture have been the fear of public health hazards and the aesthetic objections of some consumers; but with the increasing acceptance of recycled waste water for human consumption and recreational purposes, it can be expected that these prejudices will diminish. As for public health hazards, there is no risk of diseases caused by the consumption of properly cooked fish from treated sewage-fed ponds. There is an urgent need for further pilot-scale studies under different conditions, particularly in the tropics, to enable the wider use of sewage as a fertilizer in aquaculture and as a means of pollution control.

Use of thermal effluents

Temperature is one of the limiting factors in biological productivity. The problem of the disposal of water heated in the process of cooling equipment or condensing steam can be serious. If returned to a stream, the temperature may rise to a level not tolerated by fish and the entire stream may change ecologically. Caution should, therefore, be used in installing thermal power stations or industries that use water for cooling purposes.

There are many possible ways of utilizing waste heat from power plants to improve aquatic resources and the environment. Perhaps the most suitable use in northern waters would be for the improvement of aquaculture. In the temperate regions many species of fish and shellfish grow during only a brief part of the year because the waters are too cold for growth during the winter. In the United Kingdom, water from power plants has been used for the growing of plaice and sole in tanks and ponds, and it has been demonstrated that these fish can be brought to marketable size about two years earlier than if left in their natural conditions. The use of heated water for fish culture is now being actively investigated, with encouraging results, in many European countries and in North America.

Another positive use of thermal effluents would be to discharge them at some depth in the sea in order to produce an artificial upwelling. In many parts of the world, the productivity of the aquatic environment is limited by a lack of nutrients in the surface waters. Waters below the depth to which sunlight can penetrate with sufficient energy for photosynthesis are relatively rich in these nutrients. The warmer water, being less dense than the receiving waters, would entrain and carry these nutrient-rich waters to the surface and increase the fertility of the area. It should be pointed out that undesirable eutrophication need not occur, as the process would be closely regulated.

Still another use for thermal effluents in northern waters might be to maintain harbours ice-free during the winter by releasing the warm water along channels leading to the open sea. It is unlikely that this would prevent the entrance of floating and drifting ice into the harbour, but it is conceivable that a channel could be kept from freezing over solidly and could be used by fishing fleets during the entire year.

Effects on fishing and fishery products

Size of catches and landings of commercially valuable aquatic organisms, including plants, may be influenced in numerous ways, directly or indirectly, by pollution: the reducing of stocks by spectacular

mass mortalities; the gradual decline or change in the composition of populations or whole ecosystems as a result of interference with fundamental life processes; increased competitiveness of individuals; and increased occurrence of diseases. The discharge of nutrient-rich wastes may also cause a considerable increase in production which may or may not enhance the fishery resources, depending upon which species are favoured by disturbing or displacing the ecological equilibrium.

As was mentioned in the preceding section, aquacultural production can be substantially increased by the controlled use of organic pollutants as fertilizers. But uncontrolled aquatic pollution has, on the contrary, very adverse effects. In stagnant or semi-stagnant fish ponds, the dense populations of fish or fish food organisms are more severely exposed to pollutants and may therefore concentrate toxic substances in their tissues to a greater extent. Considerable economic loss has been sustained by aquaculturists in consequence of such effects. Many highly productive areas have been made unsuitable for aquaculture by industrial pollution. Large-scale mortality of fish has been reported in ponds built on old cotton or rice fields which had been exposed to repeated pesticide spraying, because of the accumulation of the residues in the soil. Very high levels of pesticides have been found in fish cultured in such ponds. Sedentary animals like oysters and mussels are more susceptible to pollutants and often build up high concentrations of toxic substances. A recent survey in the Indo-Pacific region, which supports the bulk of the world's aquaculture, showed that in most countries of the area the industry has been threatened and its expansion greatly curtailed by increasing pollution and degradation of the coastal zone environment.

Any changes of the natural environmental parameters or introduction of toxic materials can be expected to alter the energy and material flow through the food web in a way that may be disadvantageous to species used by man. For example, the reduced species diversity usually resulting from environmental stress may involve the elimination of the basic food organism of a predatory fish. Such changes may be brought about by concentrations considerably lower than would be toxic for the fish (Johnson, 1968).

When pollution causes drastic alteration of the characteristics of the habitat, the basis for production of commercial species may be substantially affected or may cease to exist. Silting resulting from erosion or dumping has reduced production of several species of shellfish and has even destroyed some very productive oyster beds, often due to clogging or interference with food intake. The physical modification of the substratum also results in unsuccessful spatfall and fixation of bivalve molluscs.

If macroalgae and sea grass disappear (e.g., because of heat discharge) there may be a resulting decline of fish production due to lack of shelter for juvenile stages of commercial species or food organisms and reduced food for associated herbivores.

In marine waters, oil is the pollutant which causes the most frequent mass mortalities, mainly of sea birds. However, marine mammals have also suffered: in 1969 some 3 000-10 000 seals were reported to have been killed in the Gulf of St. Lawrence.

The oil released from *Torrey Canyon* caused damage to both English and French coasts. Along 50 kilometres of the Breton coastline (France) some 100 000 tons of algae and 35 000 tons of animals were destroyed. This was estimated to represent a value of 5.4 million francs invested at 4.3 percent annual interest.

Thousands of tons of fish are killed annually in fresh waters by discharged chemicals: in the 1960s more than 100 million fish were killed in rivers of the United States; in June 1969, about 40 million fish were killed in the Rhine by a discharge of the pesticide, endosulfan; the combined effect of industrial effluents and sewage killed 26.5 million fish in Plant City, Florida in 1969.

Through lack of objective information, pollution is sometimes blamed for more effects than it has caused. Scientists and laymen not fully informed on the history and ecology of the Great Lakes often assume that pollution is largely or entirely to blame for the many unfortunate ecological transformations noted there. Though pollution does ultimately lead to the death of the original communities and fosters in their stead far less desiderable ones, historical reviews show that pollution was primarily responsible for such effects in only limited parts of the Great Lakes. Many transformations were originally caused by an influx of non-native species such as the alewife and sea lamprey through the Welland Canal and the smelt and carp introduced by fisheries workers. Also, the very intensive fishery itself contributed to the extinction of a series of fish species (Regier, Applegate and Ryder, 1969; Smith, 1968). In Lake Erie, the historical sequence of ecological transformations cannot be explained by pollution alone, though the degree of pollution existing there in 1970 would prevent the recovery of the ecosystem even if other stresses were relaxed.

Decreased catches may also occur because of the effects of pollution on the behavioural patterns of free-swimming species (e.g., on migration, avoidance reactions and attraction), which may reduce the availability of fish.

The environmental characteristics of coastal and river waters are decisive for the success of migration by a large number of commercial species and in many countries, inland and coastal fisheries are heavily dependent upon such species (e.g., salmonids,

eels, mullet, blue crab, shrimp). There are records of fish failing to reach their spawning or feeding areas, either because they avoided polluted waters or perhaps because pollutants interfered with their chemical sense and they were not able to recognize their home waters. There are other pollutants that do not stimulate avoidance reactions, even when in lethal concentrations; thus, migrating trout have died from the effects of certain detergents and phenols. Overall, there does not seem to be any relationship between toxicity and the degree of the avoidance reaction.

A lowered level of dissolved oxygen in the water due to the presence of organic pollution which in itself is not toxic may significantly reduce the chances of salmon reaching the spawning grounds because of fatigue and reduction of swimming velocity.

The presence of sublethal concentrations of toxicants in streams may also disturb migration patterns and so cause a decrease of population without any apparent mortality. It may also cause the failure of reproduction in successful migrants. Base metals in rivers have been shown to cause Atlantic salmon to return to sea without spawning, resulting in an overall reduced reproduction rate.

Sublethal concentrations of pesticides have been shown to cause general behaviour and fertility changes in fish. Little research has been done regarding behavioural changes during the mating season, but it is most likely that such interference also hampers reproduction.

Fishing gear and operations may be adversely affected by various kinds of pollutants. Overfertilization may cause fouling and clogging of nets, traps and other fishing gear by masses of macroalgae or other plants and animals drifting in the water or using the material as substratum. In areas of oil exploitation nets are frequently clogged by crude oil and lumps of oily tar and catches have had to be discarded because of tainting.

The numerous objects caught in bottom trawls — from plastic containers to explosives — often interfere with fishing operations.

Wrecked cars and other junk have hampered fishing — particularly in the North Sea and the Baltic — by mechanical damage to nets and boats, and good fishing areas have been closed because of the danger from dumped military wastes such as explosives, cyanide compounds, biological and chemical warfare agents and radioactive wastes. In the North Sea and along the Norwegian shelf, dumped industrial waste has recently caused great concern to fishermen. One trawler recovered as many as eight containers in one day, about half of which were leaking out their contents of halogenated hydrocarbons and other toxicants. A similar situation has been reported to exist around the Japanese islands.

The steadily mounting variety and amounts of toxic substances transported by ships are increasing the risk of serious damage through accidental discharges of toxicants, such as that which occurred at Coruña Bay, Spain, in December 1970, when drums of dieldrin and mercury were lost in coastal waters and fishing grounds had to be closed for several months.

A common reason for the discarding of catches and the discontinuance of fishing in certain areas is the tainting of the fish by unpleasant odours and tastes caused by petroleum derivatives, even at concentrations significantly below lethal levels.

Wastes from refineries and discharges of petroleum from ships are also causing increasing damage to fishing. It has been shown that a concentration of 0.01-0.02 parts per million is sufficient to cause a bad taste in rainbow trout, Japanese mackerel and some other species. Mullet, which is rich in body fat, is, by its feeding regime, likely to acquire taint more readily than other fish species in the same environment. During migration tainted mullet may join untainted schools, causing buyers to reject the whole catch. Tainting of lobsters has been reported to occur perhaps because some species seem to be attracted by and to ingest petroleum fractions deposited on the sea bottom.

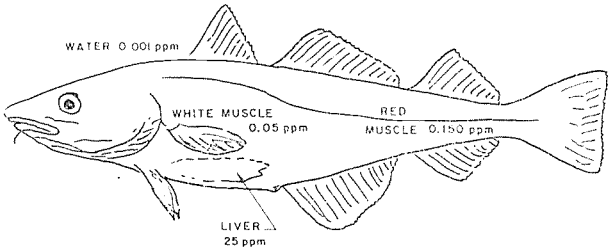
The dumping in coastal areas of chemicals or dredged materials from heavily polluted harbours may also cause an unpleasant taste in fish, as happened north of Portugal in large schools of sardines.

Colouring has a similar effect to tainting on the fish's marketability — that is, a fish product with a modified colour is practically worthless. The "green oysters" of Japan and Portugal, coloured by incorporated copper or zinc, and the "red herring" of Placentia Bay, Canada, are examples. The herring were poisoned by elemental phosphorus, which caused internal bleeding and the reddish colour. Rapid countermeasures were taken by the industry and the damage was limited.

There is evidence that pollution can cause morphological changes, teratogenic effects, skin ulcerations

FIGURE III-4

PHOSPHORUS CONCENTRATIONS IN DIFFERENT BODY TISSUES OF COD AFTER 18 HOURS IN WATER CONTAINING 0.001 ppm P



SOURCE: Jangaard, P.M. A.R.O. Circular No. 1, Fisheries Research Board of Canada, 1970.

and other lesions, as well as various other diseases (especially fungal) in fish and shellfish. This has generally been associated with waters chronically contaminated by wastes from industry or municipal sewage and sludge. The detailed causal mechanisms have so far been little studied but as such phenomena are widely distributed (Halstead, 1970), the problem has to be considered significant from a fisheries point of view.

In some countries fisheries products are eaten raw, providing opportunity for human infection by such pathogens as viruses, bacteria, cestodes, flukes and nematodes.

Bacterial contamination from domestic sewage is a particular problem to the shellfish industry. Contaminated shellfish (e.g., oysters, mussels, cockles, etc.) may be marketed, however, after appropriate treatment (sterilization, relaying or purification) which, when properly carried out, results in products safe for human consumption.

Although it has been known for many years that accumulation of chemical substances takes place in aquatic organisms, the extent of the danger has been realized only during the past decade. Of the many inorganic elements and compounds which occur as aquatic pollutants, the one which has caused great alarm recently is mercury. This material has a long-term persistence in the aquatic environment before it is eventually buried in deep sediments and is readily accumulated in aquatic organisms, including fish and shellfish.

FAO and WHO have recommended a practical residue limit up to 0.05 milligrammes per kilogramme for mercury in food products, but national standards vary from country to country. Bioaccumulation and biological magnification during transfer through food chains have caused the levels in some fishery food products to exceed the adopted standards and species of fish caught within certain areas have been blacklisted, with a resulting economic loss to fishermen.

In some instances insufficient information and misunderstanding of safety measures have caused buyers to refuse fishery products which were not contaminated or were well within safety limits. The economic effects assumed great proportions recently, when canned tuna was in the United States temporarily declared unsafe for human consumption owing to the high levels of mercury found in some samples. Swordfish fishery has suffered economically because of the rather high concentration of mercury found in this fish, most of which may be of natural origin.

Safe residue levels of mercury in fish are still being debated and opinions in different countries vary. Alarms such as those mentioned above have alerted researchers, politicians, and the public, and monitoring of this pollutant is improving.

After introduction of restrictions on use in several countries, residue levels have shown a tendency to drop in previously contaminated inland and marine waters. In developing countries some aquatic resources have been shown to be affected adversely by runoff containing biocides from agricultural use, as mentioned in previous sections. An important task is to find alternative methods for pest and vector control which do not have such serious and long-lasting environmental side effects.

Research workers have suggested recently that the release of inorganic substances as a result of mining or other human activities into tropical waters in insular areas trigger off naturally occurring biotoxicity cycles such as "ciguatera" and other fish poisoning. This makes a normally valuable food resource dangerous for human consumption, and there are instances of human deaths caused by such poisoning in the Caribbean and South Pacific islands and in some parts of the Indian Ocean (Madagascar, Mauritius). When such poisoning occurs, there may be a sharp decline in the consumption of other fish which were not affected, and the use of certain tropical fish as a raw material for reduction (fish meal) may be affected.

Paralytic shellfish poisoning may occur as a result of ingestion by certain species of bivalves (e.g., mussels, clams, oysters) of planktonic poisonous dinoflagellates such as *Gonyaulax*. In some cases, it has been shown that "blooms" of toxic species of plankton were related to the disposal of nutrients into the water, as by sewage pollution. The danger to consumers is evident, and mass mortalities of fish and other organisms are a frequent consequence. This has led to the temporary closure of certain fishing areas or to the prohibition of the sale of the products on the market.

Regional aspects of aquatic pollution with respect to fisheries

The magnitude of pollution of the aquatic environment in various regions depends in part on the density of the population and in part on the level of industrialization. The developed nations are obviously the large producers of pollution. Competition and cost considerations on the one hand and priority in planning given to rapid industrial development on the other have led to the cheapest means of waste disposal, with little regard to its environmental effects. The technology which has led to industrial development must now be applied to the control, recovery and reuse of its waste materials.

This is beconing more generally recognized as greater concern for the preservation of the environment and for the protection of natural living resources, especially of the fisheries upon which we depend for food, is growing throughout the world.

The developing countries are promoting industrialization in order to develop the capability to produce their requirements for food and other consumer goods; this can be achieved without repeating the mistakes made in the past by industrialized nations, and it is a responsibility of the world community to assist them in doing so.

The status of aquatic pollution in various regions is briefly reviewed in this section. For some parts of the world there is a paucity of information; therefore the discussion is more complete for those areas in which more extensive studies have been made.

Developed areas

The waters surrounding the North American continent range from arctic to tropical, and the pollutants introduced into them represent all those types produced by industrialized society. Therefore, the resulting problems are of an extremely varied nature.

In the arctic region, the low temperatures and the low oxygen content of ice-covered streams reduce their capacity as receiving waters. The breakdown of crude oil seems to be an extremely slow process in arctic waters and oil pollution can be considered as the most serious threat to water quality in the region. The Canadian Arctic is believed to have an immense oil potential but drilling has only recently started. Here there is a major risk of blowouts occurring during exploration. In Alaska, exploitation has taken place along the south coast (Cook Inlet) since 1962 and numerous oil spills have occurred. The drilling in the Arctic regions carries with it the ever-present danger of large-scale oil spillages by tankers and leakage from pipelines.

Fishing is by tradition the most important industry in Alaska. There, as well as in Canada, fish processing plants frequently pollute the adjacent waters. Domestic sewage is generally discharged without treatment and a large portion (25 percent in eastern Canada) of the shellfish grounds have been closed because of faecal contamination. Waste treatment frequently fails because the treatment plants are not suitably designed for working under severe climatic conditions.

Pulp and paper mills abound in the region. Locally the resulting deterioration of the receiving waters through toxicants or deoxygenation has such adverse effects on fishery, as the killing of juvenile stages of commercial fish or shellfish species and the preventing of salmon migration. With the destruction of suitable aquatic environments, and the resultant severe decline of catches of anadromous fish such as salmon and shad in the central parts of the continent, the necessity of maintaining such stocks in the northern regions becomes obvious. However, it is expected that oil and gas exploitation, the logging industry and hydroelectric developments, as well as population growth, will become a rapidly increasing threat to these resources.

Although six pulp mills are located in the Straits of Georgia, the strong tidal currents there have prevented wastes from these plants and also nutrients coming from Vancouver, Canada, from having other than local effects. This is also true of mining, mineral and food processing industries in the area. In eastern Canada, wastes from about 50 pulp and paper mills are ultimately drained into the Gulf of St. Lawrence. Intensive studies of the effects of such wastes on fish and other organisms in streams have shown them to be markedly deleterious and long-term. Many of these effects were already well known at the turn of the century as a result of research on the role of sawdust in streams.

The use of DDT in farmlands and forests has caused a great mortality rate (50-98 percent) in young salmon in areas of eastern Canada. Recently, there has been a tendency to use organophosphate insecticides, which are less persistent and less damaging to fish. Apart from mackerel, marine fish have so far been shown to have low levels of DDT.

The chlor-alkali industry in Canada until recently " used up " about 1 million kilogrammes of mercury annually. Elevated levels of mercury in some fish caused concern and industrial control programmes have been established as a safeguard.

The population of the United States is about 205 million, over half of which is crowded in land surface areas adjacent to estuaries and coastal waters. About 40 percent of all manufacturing plants are located in coastal areas, with a high concentration in the middle Atlantic coastal region. These concentrations of population and industry have resulted in damage to aquatic resources in a vast number of rivers and lakes and in many estuaries and coastal areas. The major overall source of pollution is municipal waste, a great part of which does not undergo secondary treatment. Manufacturing is also a major source of water-borne waste, and industrial production in this area is presently increasing by about 4.5 percent annually (three times as fast as the population growth).

The increasing need for electric power, which has tended to double every ten years, is mainly responsible for the production of waste heat. With the increasing number of nuclear power plants, which require more cooling water than fossil fuel plants

to produce a given amount of electrical power, more and more waste heat will be discharged, increasing environmental hazards.

In the coastal zone the need for land-fill and disposal of solid waste is seriously competing with interests to protect living resources. In 1965 the New York metropolitan area produced about 17 million tons of solid waste, a figure that is expected to triple within 35 years.

The once abundant Atlantic salmon has now almost disappeared from the east coast of the United States. On the west coast, heavy fishing in conjunction with aquatic pollution and the construction of many hydroelectric dams has significantly reduced the salmon industry. Production of oysters and other bivalves has faced a decline in nearly all estuarine areas, either because of mortality stemming from silting caused by dredging operations and poisoning by industrial wastes or because bacterial contamination from municipal wastes has forced the closing of the oyster-beds. Raritan Bay, New Jersey, once a rich producer of oysters, is now almost devoid of this mollusc because of sewage and industrial pollution (Wastler, De Guerrero, 1970).

The shrimp resources have showed a similar general decline. Thus, the Galveston Bay, Texas, catch of shrimp was reduced by more than 50 percent between 1962-66 in spite of increased market demands. Landings of shrimp from Apalachicola Bay (Florida) in 1967 were less than 17 percent of those in 1964. It still remains to be demonstrated which of man's activities has had the greatest effect: municipal and industrial pollution, dredging and filling operations, or agricultural runoff of pesticides, a group of compounds to which shrimps are extremely vulnerable.

Aquatic pollution in European inland and coastal waters involves more or less the same problems found on the North American continent. (See Figure III-6.) Rivers suffer most. About 7 percent of the length of rivers in France and Hungary, 15 percent in Austria and 35 percent in Poland are so heavily polluted that fisheries have been decreased or eliminated. Chronic pollution, as can be expected, is most frequently associated with high population density. Seasonal increases of population by tourism are causing eutrophication in mountain lakes and in rivers passing through central European ski-resort regions. Domestic sewage is one of the most important sources of pollution, but lack of sewage treatment is still the rule in many countries, particularly in southern Europe. In Italy, for instance, only 32 of the 8 049 towns have complete sewage treatment plants (Marchetti and Sommani, 1970).

Some of the most important industrial polluters are the iron and steel, textile, paper and pulp, tanning, chemical, oil and mining industries. Obviously, the effect of any one discharge on the recipient river is modified by many factors such as characteristics of effluent, river flow and other pollutional stresses. Until recently one small Italian river with a very low summer flow received effluents from 1 109 industries along 47 kilometres of its course.

Chronic damage to inland fisheries is caused by a variety of organic and inorganic substances, of which chlorinated hydrocarbons, mercury and phenols seem to be the most frequent offenders.

In areas with extensive agriculture, oxygen depletion in streams and lakes occurs through organic wastes from husbandry, silage and food processing industries, or indirectly through runoff of fertilizers from farmland. Seasonal organic pollution is caused by beet sugar industries in central Europe and by distilleries and olive oil mills in southern Europe.

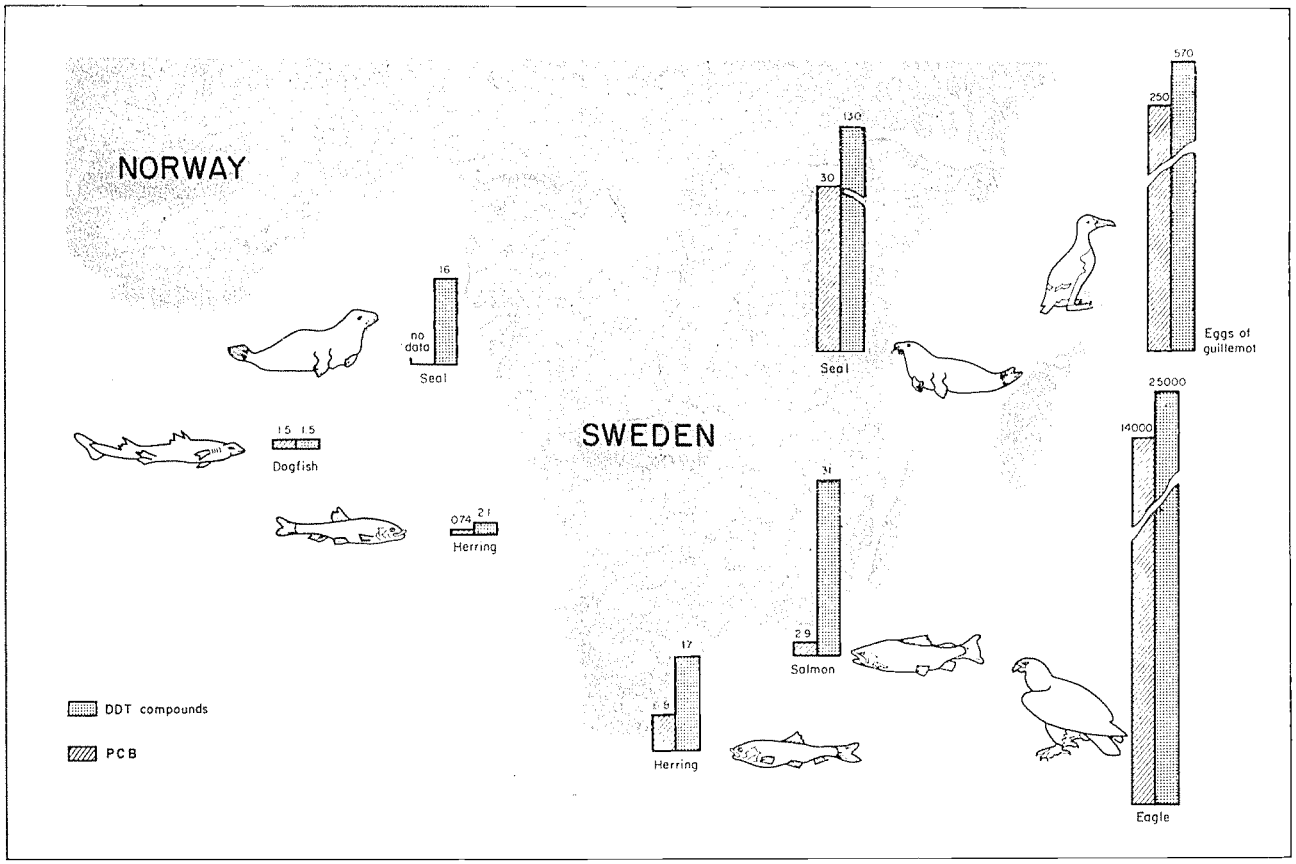
Freshwater pollution becomes an international problem when a polluted river (e.g., Rhine, Maas, Danube, Strymon) crosses the borders or when acids transported through the atmosphere from industrial regions cause increased acidity in lakes in other countries.

Many of the deep clear lakes in and around the Alps have become markedly eutrophic in recent decades. Lake Zurich was one of the first to be transformed and many more, such as lakes Constance and Garda, are moving rapidly in this direction. From a fisheries viewpoint, the highly prized deep-water trout or char are the first to disappear when eutrophy occurs; and gradually other species of trout, lake herring and whitefish stocks are destroyed until the lakes become fully occupied by an association dominated by perch and the carp-like fishes, for which there is generally little market demand.

The physical characteristics of the Baltic make it relatively vulnerable to stress by pollution. The density structure of the water column and the increased supply of nutrients seem to have been the causal agents of a progressive and accelerating decrease in the oxygen content of the bottom waters. The Baltic itself receives sewage and industrial wastes corresponding to a biological oxygen demand of more than 1 000 tons of oxygen per year. The sewage load is expected to increase but the treatment of some wastes from paper and pulp industries is being improved, especially in Sweden and Finland. These industries are responsible for a major part of the organic load in the northern parts of the Baltic (Dybern, 1970).

Mercury is one of the toxicants of greatest concern in this region. The sale of catches from a number of Swedish inland waters and some coastal areas has been banned because the fish were found to contain more than 1 part per million of mercury. In the open sea, all fish investigated have been found suitable for human consumption. Baltic fish,

FIGURE III-5. — THE CONTENT[1] OF DDT COMPOUNDS AND POLYCHLORINATED BIPHENYLS (PCB) IN MARINE ORGANISMS FOUND IN THE SEA WEST OF SWEDEN AND IN THE BALTIC



[1] Content is expressed as milligrammes per kilogramme of fat tissue.
SOURCE: Jensen. S.. Johnels. A.G.. Olsson. M. and Otterlind. G. DDT and PCB in marine environments. *Fauna och Flora*. 64(4). 1969. (In Swedish)

seals and fish-eating birds show considerably raised levels of DDT and its derivatives and PCB as compared with the eastern North Sea (see Figure III-5). Since the use of several persistent pesticides and of mercury for seed sterilization and as a fungicide in paper and pulp mills has been prohibited or limited in several countries around the Baltic, a gradual decrease of the amount circulated in the ecosystem can be expected.

Oil tankers of up to about 100 000 tons can enter the Baltic, so that large oil spills are a permanent threat, and oil prospecting may bring further problems. Every year hundreds of oil discharges are recorded, but severe cases have been relatively few.

Ammunition dumped after the second world war has also been reported to interfere with fishing from time to time.

The North Sea is a recipient for wastes from several regions of high population and industrial density. It receives large quantities of sewage from rivers and coastal outlets and, to an increasing extent, through pipelines from population centres. The use of pipelines tends to move the load from estuaries to offshore waters, where fish spawning grounds are sometimes threatened. Sludge disposal takes place in several areas (e.g., in the outer Thames estuary, which receives more than 5 million tons a year) with little apparent ill effect. Fertilization by municipal sewage has not been proved to have other than local effects (e.g., in the Oslo Fjord) but the possibility exists that increased nutrient levels have a relation to the toxic plankton blooms observed in recent years.

The levels of pesticide residues in some fish species are rather high, but, as the use of hard pesticides in the bordering countries tends to decrease, it can be assumed that a further increase will not occur. Locally, particularly in the Waddensee in the Netherlands, the load of pesticides carried by rivers poses a real danger to shallow water shellfish resources (Cole, 1970).

The waste products from industry are of an extremely varied nature. Although the load of such wastes is remarkably high, no large-scale damage has been demonstrated. However, in view of the

complex nature of these wastes, the fear seems justified that various sublethal effects on marine organisms may occur.

Recent history has shown that the threat from accidental oil pollution is growing in this region and therefore a certain amount of preparation exists in anticipation of possible future disasters. Organizations have been set up by some countries to combat released oil, and stocks of dispersants and sinking agents are kept available to be used in the open sea away from areas which are vulnerable from a fisheries point of view. No satisfactory method exists as yet to deal with every kind of oil pollution without damage to organisms, but new materials and methods are constantly being developed. Total destruction of seabird colonies near main shipping lines is an unfortunate likelihood, as no effective means to prevent the oiling of birds exists.

Fishery resources have been damaged in many estuaries, fjords and other coastal areas. However, in the open sea no clear relationship between pollution load and effect on fish stocks has as yet been found.

It should be mentioned that it seems increasingly evident that there is a risk that the production and survival of young fish to replace the stock reduced by over-exploitation may fail unless the environmental conditions are exceptionally favourable during the early stages of life.

The dominant pollution problem in the open Mediterranean Sea is oil, but the coastal zone is affected by a great variety of pollutants. The major rivers and the Bosporus transport large quantities of domestic waste into the Mediterranean. This sewage, with very few exceptions, is discharged with little or no previous treatment. Between Barcelona and Genoa, the coastal population comprises 11 million people, and in some places, the population is seasonally increased to almost three times its normal size by tourism. A similar situation exists in Yugoslavia and in summer resorts of the Black Sea. Microbiological contamination of shellfish occurs regularly in several countries. The western Mediterranean receives the bulk of the industrial pollution, derived mainly from the food processing and chemical industries, especially in Spain, France, Italy and Algeria (Groupe d'experts CGPM/CIESM de la pollution marine, 1970).

Hydrocarbons are produced in the eastern Mediterranean and Algeria, but the oil refineries are mainly in the western part. In the eastern part of the sea there are several loading harbours for crude oil. Oil pollution occurs widely in this sea, the main sources being discharges from ships and loading harbours. Following the closure of the Suez Canal, oil transportation and oil pollution of the eastern Mediterranean has decreased, while that of west Africa has increased. In addition to polluting most bathing beaches in the Mediterranean, the oil frequently causes tainting of fish, eels, mussels, mullet and even tuna, rendering them unpalatable.

Pesticides, including the chlorinated hydrocarbons, are used extensively in most agricultural areas surrounding the Mediterranean and have caused the death of marine organisms, including fish.

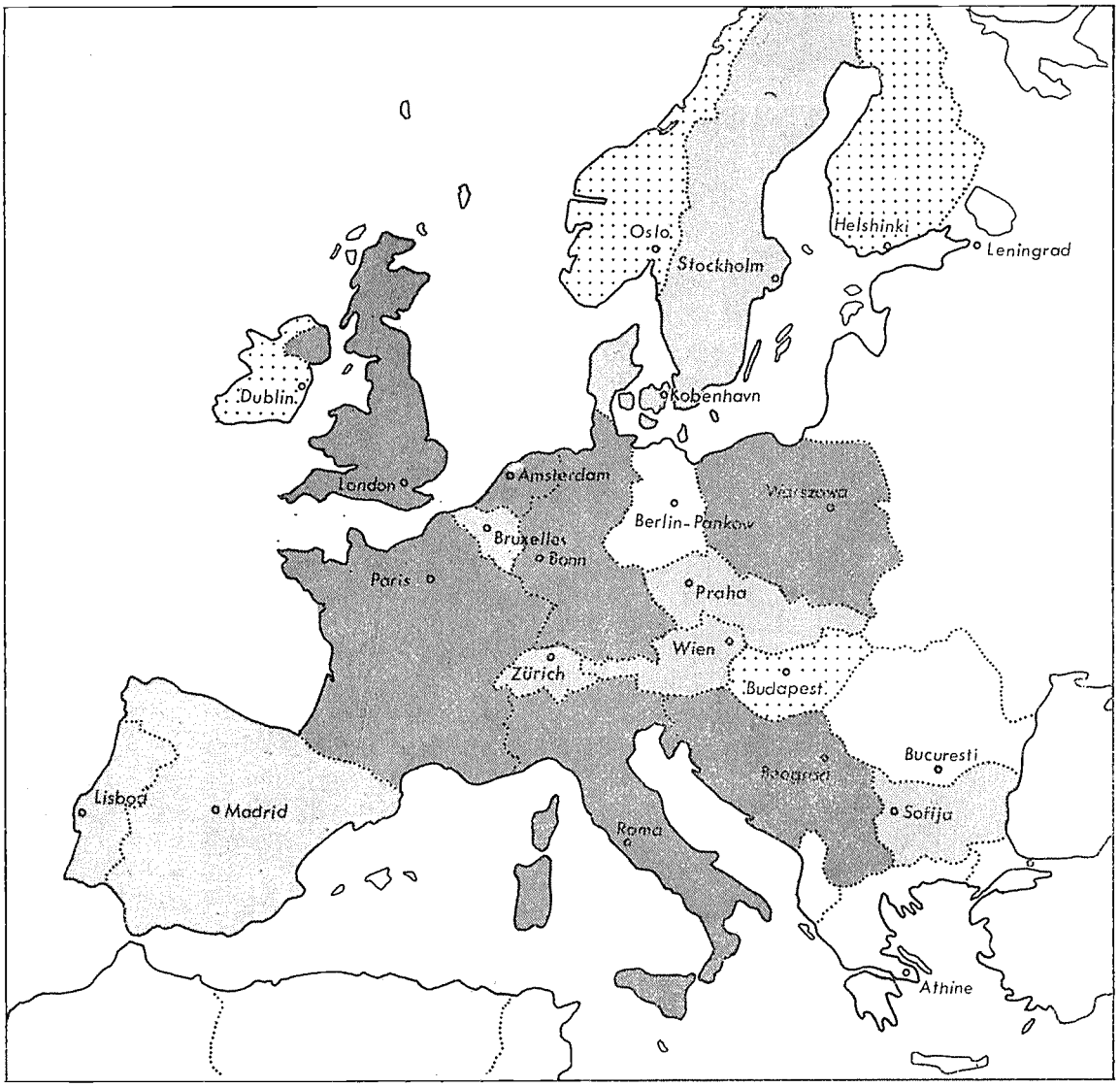
In the European socialist countries high priority is given to rapid national economic growth; this has been especially true in the U.S.S.R., where industrial development began only about 50 years ago and then was seriously disrupted by the second world war. Consequently, there are severe water pollution problems emanating from industrial and urban centres and affecting such large rivers as the Don, the Dniester and the Dnieper.

In the Caspian Sea pollution is in places severely affecting the productivity of the fisheries resources and the economically important sturgeon fishery has suffered serious damage. During the last 35 years there has been a significant reduction in catches of fish, the major causes being industrial pollution (mainly from the oil industry), hydroelectric power installations in the tributary rivers where fish spawn, and a lowering of the sea level. Kasymov (1970) reported that due to pollution off the Azerbaijan coast in the western part of the Caspian Sea, there has been a definite reduction of benthos and plankton, and some areas are devoid of fish. With the exception of herring, the catches of commercial fish species in this region have been reduced by a factor of 10 or more.

In Poland, pollution often becomes acute in winter, when the rivers are covered by ice and no reoxygenation can occur. Many rivers have been depleted of fish and in others there has been a steady decline of catch. During the period 1952-54, six fishing cooperatives operating along the Odra and the Warta reported a total annual catch of 450 tons; in 1970 only 150 tons were caught. In Poland, as in other socialist countries, it is expected that with the antipollution measures now being used this situation will improve. Hungary reports that annually about 50-100 tons of fish are killed by water pollution, but that more spectacular accidents have occurred; in 1954, 200 tons of fish were killed in a tributary of the Danube and in 1965, 500 tons of fish were killed in Lake Balaton as a result of repeated discharges of pesticides.

As Japan is highly industrialized, it suffers from virtually all kinds of acute aquatic pollution, a process which has developed dramatically over the last decade. The deterioration of freshwater bodies has become severe and all rivers in developed areas are polluted. Also, coastal marine pollution is increasing and is presently causing considerable damage to

FIGURE III-6. — THE WATER POLLUTION SITUATION IN EUROPE - 1969



SOURCE: FAO FI - EIFAC/70/SC/3.1, May 1970.

living resources, especially in the "Inland Sea," where many fish culture stations are based. Some of the most important sources of pollution besides sewage outlets are pulp mills, the fermentation industry, fish-processing plants, synthetic fibre plants, steel works, the titanium industry and petroleum refineries. The largest coastal areas affected are in the Tokyo, Osaka and Ise bays, which receive mixed effluents in large quantities.

Some Japanese pollution problems merit specific mentioning because of their economic or public health implications.

The oyster industry has been seriously affected in a number of ways. The "green oysters" caused by accumulated copper are not marketable, nor are oysters which have been exposed to oil pollution. Microbiological contamination may also have affected the oyster industry and specific cases of large kills of oysters have been reported. Red tides occur regularly in several bays which receive nutrient-rich effluents, and dredging has caused plankton blooms by liberating nutrients from the bottom mud. Effluents from fish-processing plants in Matsushima Bay, a prominent oyster culture district, appear to be indirectly responsible for the large-scale oyster kills that have occurred every summer since 1961 (through overgrowth and overmaturity caused by eutrophication and high water temperatures).

Fish are frequently tainted by oil. In Osaka Harbour, the taint is reportedly acquired from oil in the bottom mud. In Yokkaichi, which has several petroleum industries, all species of fish caught within

2 kilometres of the harbour were found to be tainted by oil products, and the smell of oil could be detected in certain species of fish and crustaceans found within 4 to 15 kilometres of the harbour (Nitta, 1970).

Laver (seaweed used for human consumption) is also subject to oil taint. Although seven years have passed since the last serious outbreak of " Minamata disease " (mercury toxicosis) and this pollutant is now carefully monitored, mercury still occurs in elevated levels in fish from the area.

Inland waters are affected by pesticides more than marine waters. After instances of very large kills of shrimps by pesticides (1953) and of clams by herbicides (1962) in the Ariake Sea, attention has been brought to this problem.

Although there is a lack of quantitative data available to demonstrate aquatic pollution in Australia, there is enough subjective information to justify the conclusion that acute pollution exists in many freshwater areas and in the vicinity of twelve population and industrial centres along the coast.

An Australian senate select committee recently concluded that " Rivers, streams, lakes, coastline and underground aquifers are being polluted in all states and territories. Some waterways can no longer be used except as sewers. Fortunately, the deterioration of our water resources has not become so severe in Australia as it has in most other communities and in other advanced industrial countries. But the difference is only a function of growth and time."

Pollution from sewage is mainly a freshwater problem, although the sewage discharged into the sea appears to be mostly untreated, or only mechanically treated. There is a tendency for more frequent construction of submarine outfalls. Bacterial contamination of bathing waters and of oyster beds has been reported.

Australia has a significant potential for oil production, and exploration goes on in a number of places along the Continental Shelf. Harbours, areas near refineries and accidental discharges of oil present a potential danger for disastrous discharge on the northwest coast (Barrow Island) and in Bass Strait. Drilling on the Great Barrier Reef is under consideration and may create a risk for this particularly vulnerable biota. Fish from coastal waters has from time to time been declared unsalable because of tainting from refinery discharges.

The available data, although sparse, as well as on-the-spot observations, indicate that persistent pesticides are being accumulated in aquatic biota to an extent which sometimes results in the death of fish (as has been reported in New South Wales). The danger exists of pesticides reaching parts of the Great Barrier Reef and damaging the associated ecosystem. The explosive growth of the " crown-of-thorns " starfish has been ascribed by some to pesticides, but several other theories have also been proposed and the cause is not yet clearly identified. This creature has destroyed many areas of coral reefs.

A great variety of industries cause pollution in inland estuarine and coastal waters, and a number of power stations discharge cooling water into the sea, but the ecological effects of these activities do not seem to have been studied.

In New Zealand, aquatic pollution appears to be limited. The main sources of pollution are human and animal sewage, agricultural runoff, and localized pollution from paper mills, a refinery, and an iron and steel mill. Oil pollution has been minor, but may become a problem with the exploitation expected to be initiated off the west coasts of the North and South Islands in the Tasman Sea.

Developing areas

Fishery in lakes and streams is of considerable importance in southern continental Asia. Fresh and brackish water aquaculture has also been long and widely practised there. At present, the need to maintain water quality to enable continuing or increased fish production is competing with other needs for water use, particularly in the more heavily populated areas; there is nothing new about this, but in some regards the pattern is characteristic of this region.

The recipient capacity of the rivers of the region is very much influenced by their type of regime. The Himalayan complex is drained into several countries by a great number of rivers, some very large, with a continuous flow of water throughout the year. The flow of " monsoon-type " rivers is small or nonexistent during the hot, dry period, with a consequently much-reduced capacity to handle organic load and dilute toxic wastes. During the monsoon period the flow may be increased by a factor of 100-500 and even exceeding 1 000.

The problems of water supply and quality management are immense, and it appears that the use of the water for fishery must largely yield to domestic, industrial and agricultural (irrigation) uses. About 15 percent of the cultivable land in India is irrigated and uses about one fourth to one third of the available water. Before the irrigation water gets to the fields, much of it has been utilized for discharges of municipal wastes. Very few of the cities have secondary treatment of domestic waste, and during low water *E. coli* counts downstream are very high. Sometimes the water used for irrigation consists of 50 percent sewage. The largest cities (Bombay and Calcutta, 5 million; Delhi, 2.5 million; and Madras, about 2 million inhabitants) have only partial and mostly very insufficient sewage treatment. Most

of the urban sewage water is eventually distributed into irrigated farmland.

Industrial pollution in fresh waters is especially significant in areas with monsoon-regime rivers. When impoundments are necessary for securing the water supply, the downstream flow is sharply diminished and has a consequently very limited capacity to accept further pollution. No central water pollution control laws appear to exist in India; however, some states have recently passed such laws. The industries causing the major problems are pulp and paper, textile, fertilizer, oil refinery, organic chemical, distillery, shellac, tannery, dairies, and slaughter houses (FAO, 1967).

The use of pesticides for crop protection and for control of malaria and filaria has assumed large proportions and is increasing. During 1968/69, 32 000 tons of BHC (benzene hexachloride), DDT, endrin and other chlorinated hydrocarbons and organophosphates were used for crop protection. For public health purposes about 8.5 tons of DDT were used in 1964-65. Many fish kills have been attributed to the massive use of this substance.

The use of ecologically less dangerous biocides will, however, involve a substantial increase in costs, and this aspect needs to be taken into consideration.

It seems obvious that water pollution in India is mainly an inland-water problem, but where polluted rivers reach the coast their influence may be marked on estuarine or coastal ecosystems. An example is the Hooghly Estuary, downstream Calcutta, which now receives the wastes from about a hundred industries. Fishing has greatly declined there since 1949, but few large-scale fish kills have been reported. Other polluted coastal areas are near Bombay and the outlets of the rivers Krishna, Godavari, Cauveri, Cooum and Chaliyar. (Coastal lagoons, mangrove and coral reefs pose special problems that will be discussed below.)

In several parts of the region where increased population density and degree of industrialization occurs, the problems are similar to those in India.

In Thailand a notable decrease in inland fish catches in the eastern province was reported from 1963 (696 tons) to 1968 (68 tons) and it has been suggested that water pollution is the main cause. Bangkok (1.6 million) has no waste treatment and water quality downstream is reportedly very poor.

Another kind of pollution has been experienced in Viet Nam, where during the war there has been extensive use of herbicides for defoliation and crop destruction, as well as of other chemical warfare agents. In the south, one fifth to one half of the mangrove forests, some 1 400 square kilometres in all, have been destroyed. The effects on aquatic life have not yet been evaluated, but from experimental evidence and field experiences in other areas they can be expected to be significant. Some of the chemicals used have been demonstrated to have adverse effects on reproduction and embryonic development in mammals.

The Philippines, being mainly an agricultural country, has only recently begun to have industrial pollution problems, for the most part in inland waters. Mining operations impose a heavy silt load in several rivers. In Mindanao, the Aguo River is increasingly polluted by effluents from chemical plants, pulp and paper mills, an integrated steel industry, and logging operations (Lesaca, 1970).

In marine waters oil pollution appears to be the main problem. This applies particularly to Manila Bay, where dissolved oxygen levels have become significantly lower. A number of rivers and bays are being contaminated by organic wastes from lumber operations and the sugar-fermenting and coconut-processing industries.

In 1969 the archipelago off southeast Asia produced 850 000 varrels of oil per day. Recently, exploration off the coasts has revealed a number of new sources of oil with low sulphur content. Explorations are now going on off Sumatra, in the Java Sea off Kalimantan, Brunei, Sabah and West Irian and elsewhere in a region of potential oil resources stretching from Burma to Torres Strait on one of the world's largest areas of continental shelf. These activities, and in particular, the expected future increased production of oil from off-shore drills, increase the dangers of pollution in the area.

Pollution of coastal and estuarine waters has, during the past few years, increased so rapidly that the existing coastal aquaculture operations in many of the countries in the Indo-Pacific Region are seriously threatened and their potential for future extension and development very much reduced. This is especially true in countries like Singapore and China (Taiwan), which have already attained a certain degree of industrialization.

A great number of the Indo-Pacific islands lack fresh water resources other than groundwater. The increasing tendency toward the clustering of the inhabitants into towns and the expansion of tourism increases the discharge of concentrated sewage into lagoons and shallow water adjacent to coral reefs. These lagoons usually have a restricted exchange of water with the open ocean. The destruction of a fishery resource on which the living of the people inhabiting the shore was originally based may have deleterious effects on food habits and nutrition, and may also reduce tourism. Such destruction has also been reported in Latin America and Africa where some coral lagoons have been degraded because of eutrophication or increased turbidity.

Coral reefs are very productive, and though there has not been any assessment of possible maximum

sustained harvest, it is well known that in many tropical areas reef fishery is of major importance for the local people. But coral reefs are also very vulnerable to changes of environmental parameters such as increases in turbidity, temperature, and nutrient content of the ambient water, and have generally poor ability to regenerate after destruction.

Apart from local destruction by the stresses mentioned and by the starfish, *Acanthaster planci* (the population explosion of which is said at this stage to have a possible relation to pollution), coral reefs are also damaged by destructive fishing methods.

Another very productive tropical coastal biotope is the mangrove swamp, which provides feeding grounds and shelter for a number of commercial species of fish and shellfish and their young. If mangroves are destroyed the basis for the ecosystem is torn up and the shallow waters deprived of sheltering growth are exposed to sedimentation, fertilization, and other influences from the land.

The African continent shows a heterogeneous distribution of population density, industrialization and urbanization. Climatic conditions also vary widely, from desert to rain forest, and the water pollution situation varies accordingly. From what is known some rather broad lines can, however, be drawn. The pollution situation is not at present seriously affecting fisheries. But the major cities are expected to grow very rapidly (e.g., by the year 2000 Greater Kampala is expected to grow from 335 000 to 1 700 000 inhabitants, and Jinja from 115 000 to 1 000 000) and new industries are being established at an increasing rate. Both these trends will obviously lead to pollution problems in the near future unless adequate management measures are initiated at once. It is probable that during an initial phase the effects of water pollution will become more obvious as a public health problem than as a fishery problem. Detailed reports on the effects on aquatic life of the present extensive use of pesticides are not available, but it seems probable that this may be the most serious pollution problem at present affecting inland and coastal fisheries in Africa. The use of pesticides on rice fields, which also serve as spawning areas for fish, would have especially damaging effects. More field research on pesticide residues and their effects on aquatic life in tropical areas is urgently needed. There are also indications that many of the pesticides used in arid regions evaporate into the atmosphere and thus make a substantial contribution to the contamination not only of adjacent areas but also to the world at large.

Oil pollution problems exist in various degrees in all African coastal states. The problem is more pronounced (and is becoming chronic) in oil-producing countries like Nigeria, where heavy pollution occurs near offshore drilling operations, refineries and harbours; but other coastal states are also having their beaches fouled by oil from tankers discharging at sea. Since the closure of the Suez Canal this type of pollution has considerably increased, as has the risk of serious accidents involving tankers, which, for lack of skilled personnel and facilities, no African country is prepared to combat effectively. Further examples of water pollution in Africa can be mentioned: oyster beds in the coastal waters of Kenya are affected by bacteriological contamination from sewage; coffee-pulping and sisal-processing wastes are strong organic pollutants which often cause oxygen depletion and fish kills in small rivers in Kenya and Tanzania. An extensive investigation was recently begun on water pollution effects of drainage from the copper mines in Zambia. Lake Mariut in the Nile delta area, which formerly had an annual fish production of 8 000 tons, now produces only 2 500 tons because of overloading with sewage, and probably pesticides have also had adverse effects. Similar effects appear in the lagoons near Tunis. Discharge of paper mill effluents without pretreatment near Alexandria (U.A.R.) has resulted in large areas of the sea bottom being covered with fibres and has rendered the water anoxic. Fish have of course disappeared from the area.

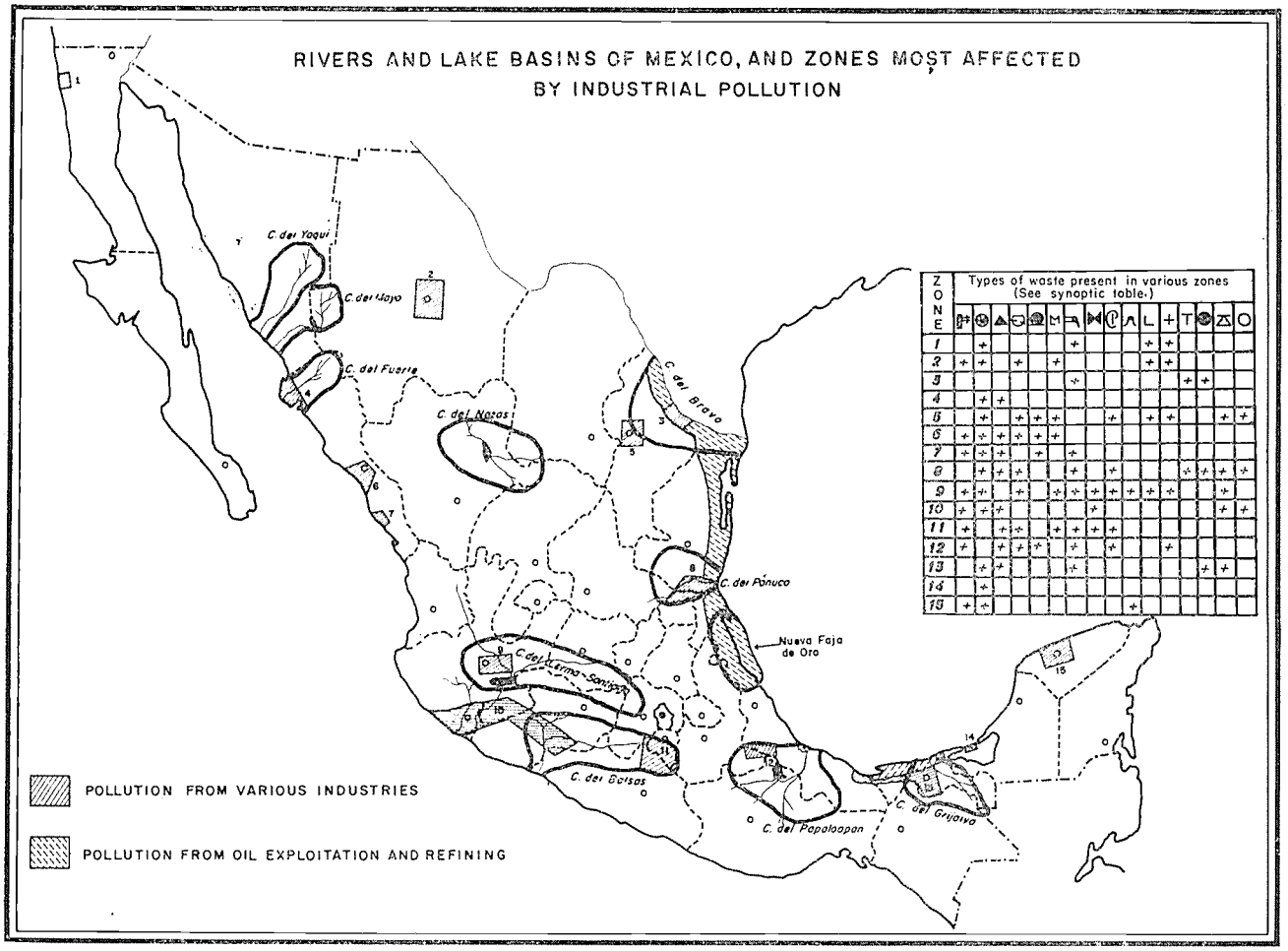
In several Latin American countries, increasing awareness of the possible effects on fisheries of pollution stemming from industrial and urban development and intensive use of pesticides in agriculture has recently stimulated limited governmental investigations and consideration of the adoption of adequate protective measures.

Intensive crop culture has here, as in many other countries, brought about overfertilization of lakes, streams and limited coastal areas through discharges of organic wastes from food-processing and other industries. In Mexico there were (1969) 92 sugar industries with a production of about 2 365 000 tons of sugar. On the coast of Alvarado, these, together with pulp and paper industries, caused serious damage to shellfish (ostiones) and bass (robalos) production (Cifuentes, Rodriguez and Zarur, 1970).

In Cuba, the sugar industry contributes heavily to the organic load of rivers also fertilized by wastes from paper mills, coffee-processing plants and land runoff. Several provinces reportedly have serious water pollution problems. In Havana Bay only pollution-tolerant fish occur.

The extent of pesticide pollution in the region can only be guessed at. A number of fish kills due to, or thought to be due to, pesticide contamination have been reported from Cuba and Mexico. In the latter country, about 16 tons of DDT, aldrin, endrin and lindane are used annually in agriculture. In Nicaragua and El Salvador pesticides are sprayed from aeroplanes on cotton fields 40-60 times a year;

FIGURE III-7. — RIVERS AND LAKE BASINS OF MEXICO AND ZONES MOST AFFECTED BY INDUSTRIAL POLLUTION



SOURCE: Cifuentes L., J.L. *et al.*, 1970.

a certain part of these no doubt enters the ecosystems of rivers and coastal lagoons, many of which are important for shrimp production.

Petroleum and related industries appear to be the most important source of pollution in Mexico, Trinidad, Colombia, Venezuela and, to a more limited extent, Peru and Argentina. In Lake Maracaibo alone there are 5 500 wells, 7 000 kilometres of tubes and 10 oil-loading terminals (Lara and Razetti, 1970). In the Orinoco delta there are comparable installations. It is obvious that with a production of about 2.5 million barrels a day, spills are unavoidable (Lake Maracaibo has averaged about two significant discharges a day over the last few years). The projects for two major petrochemical industries may be expected to add to already existing problems in the protection of the coastal fish and shrimp resources. In Mexico, 32 petrochemical industries with coastal discharges are operating at present (see Figure III-7). Some cases of coastal pollution have been reported from Peru in connection with disposal of wastes from fishmeal industries.

Water quality and the monitoring of pollution

From the preceding chapters it should be clear that water pollution is a threat to water quality, to the aquatic ecosystem and to fisheries resources. Water itself is a valuable resource, and we are using increasing amounts of it in our homes and industries. The water in some rivers in developed countries may be used over and over again as it flows from the source to the sea. This reused water should be purified to acceptable levels before being returned to the stream or river — and the technology exists to purify water of pollution to almost any level required. Naturally, higher water-quality standards will require more expensive treatment.

It will be necessary to determine water-quality standards for each purpose, and it should be recognized that these will vary, depending upon the

FIGURE III-7. – RIVERS AND LAKE BASINS OF MEXICO AND ZONES MOST AFFECTED BY INDUSTRIAL POLLUTION

Synoptic table of the principal types of waste shed into Mexican waters

(Distribution by zones is indicated in the figure, using the symbols recorded on this table.)

ORGANIC	From oil and its by-products		Crude oil
			Chemical mixtures resulting from drilling operations
			Solid suspended matter
			Salt solutions
		T	Refineries: lead salts, soap, phenols, acids, alkalis
		●	Petrochemical derivatives
	"Black water"		Organic matter
	From breweries and distilleries		Organic matter
			Ethyl alcohol
			Sewage water from washing of containers: detergents and caustic soda
	From the sugar industry		Organic matter
			Residues from sugar bleachers: hypochlorites and chalk (CaO)
			Sewage water from washing of machines: detergents and caustic soda
	From the food industry		Organic matter
			Sewage water from washing of machines: detergents and caustic soda
	From wood preservation		Creosote
INORGANIC	From the mining industry	O	From extraction of metals: sulphuric acid and salts of various metals
		O	From mineral carbon: mud, loose sand, fine carbon particles
	From metallurgy	M	Oils used in cutting and cooling
		M	Deoxidizing solutions
		M	Metal oxides
		M	Cyanides and various metal salts
	From tanneries		Chrome salts, sodium sulphide, tannins
			Organic matter
MIXED	Pharmaceutic and chemical products		A wide variety of wastes and residues
	Synthetic fibres		Hemicellulose, glucose, caustic soda, sodium compounds, polysulphides, light acids, soap
	From cellulose and paper industries	@	Digested liquids
		@	Liquids resulting from decortication and chipping
		@	Wood and paper fibres
		@	Various chemical compounds
	From clothmaking industries		Wool and cotton fibres
	From pesticide industries	L	Residues of most of the known pesticides

proposed further use of the water. Potable water and protection of fish resources will need high standards, while many industrial uses will have less stringent requirements. Once standards are determined, a monitoring system is needed to ensure that the standards are met.

Water-quality criteria and standards

The total amount of water on earth does not change; the volumes of the global water bodies — oceans, inland water, ground and atmospheric water — remain essentially the same as they have always been. Man's need for water is, however, increasing rapidly, especially in the industrialized countries, where it once was a no-cost commodity but has recently become a limiting factor for many undertakings.

The multiple uses of water result in manifold changes in its properties, and the demands for water with specific properties make the control of pollution at the source essential. Some countries tend to handle each situation as it occurs, but most of the industrialized nations are aware of the need for a systematic approach to the total problem of pollution control and water resources and are taking steps in this direction. The first step must be to determine scientifically the requirements for each water use — for example, how much of a specific pollutant is permissible in water if fish are not to be damaged (this may be very different from how much of the pollutant is permissible in processing water for industrial purposes). These requirements based on scientific knowledge are called water quality criteria.

Criteria may be different for each species and climatic condition. Thus, criteria for fish in North America are not necessarily valid for tropical species found in Africa or South and Central America. The effort to establish these criteria in each area will involve a major scientific undertaking.

Man is not only affecting the quality of water by introductions of various substances, but also by the creation of reservoirs which have severe effects on fish when the natural flow of rivers is radically changed. There is therefore also a need to increase research on this aspect, which until now has been neglected.

It is not sufficient to determine the maximum concentration of a contaminant that will not kill adult fish. The objective of the criteria is to state the level that will not have any adverse effect on the fish during its entire life cycle. The problem is complicated by the possible interaction of two or more pollutants, when the biological effects may be more than additive.

After criteria have been set, the next step is to transform them officially into standards and regulations. These of course are the responsibility of national authorities for inland waters, but may require international agreements for bodies of water crossing national boundaries and for the sea. For practical reasons it has been found advantageous in many countries legislatively to establish standards in the form of classification of water for various uses. Clearly, no sound standards are possible without sound criteria, but it is equally true that the "unknown still outweighs the known." Therefore a continuing exchange of information is needed between scientists and decision-makers, and an important objective of FAO is to act as a forum for such dialogues. The European Inland Fishery Advisory Commission (EIFAC), has undertaken to determine water-quality criteria for freshwater species in the region and has formulated criteria for suspended solids, pH-value, temperature and ammonia. Work is in progress on phenols, mercury, copper and zinc.

Warning and monitoring systems

In attempting to evaluate pollution problems both scientists and administrators are often faced with the lack of adequate information. Information may be available for a few local areas, but it is impossible to extrapolate with confidence from these localized conditions the effect of a pollutant on a worldwide basis, and it is therefore also impossible to develop an adequate balance sheet for any of the major pollutants. As has been shown above, the total world production of many pollutants such as oil, other fossil fuels, toxic heavy metals and persistent pesticides is relatively well known, but the ultimate fate of these materials after their release to the environment is still largely unknown. Estimates can be made of the quantities of materials carried by the atmosphere or by the rivers to the sea, but they generally depend on extrapolation from very few measurements of the concentration of the pollutant in a few areas to an estimate of the total global atmospheric circulation or the total river discharges into the ocean.

The ocean is the ultimate sink for all pollutants whether transported indirectly by the atmosphere, by rivers, or even if they are trapped temporarily in the soil, where they are subject to the slower processes of geological erosion (with the exception of radioactive substances). Analyses have been made to determine the concentrations of only a few pollutants in the oceans and their inhabitants. In no case is this information adequate to define properly the baseline concentration for more than small areas. Extrapolation to a worldwide basis is obviously, at best, an informed guess. The total quantity of a pollutant circulating in the ecosystem depends on the rate of its production, the rate of its addition to the aquatic environment by the various transport mechanisms, the rate at which it is decomposed by natural biological, chemical or physical processes and the rate at which it is removed from the environment by precipitation to the bottom and ultimate burial in the sediments.

The way to obtain this type of information on an adequate scale is by means of a system of surveillance and monitoring of environmental conditions. Even though we are here concerned with aquatic conditions, it should be emphasized that such a monitoring system would benefit by being developed within a broad framework covering air and land as well as water pollution. As will be discussed below, this monitoring system need not be set up *de novo* on a global scale; there are in existence national and regional monitoring systems, most of which have been set up for special purposes, and some of these could be expanded to include critical pollutants at little additional expense. FAO already monitors fish catch and some biological parameters on a global scale, and other bodies of the United Nations are concerned with statistics of the production of various industrial products. The exchange of oceanographic data and a network of national and world data centres have been promoted by the Intergovernmental Oceanographic Commission. The World Meteorological Organization is dealing in a similar way with air pollution monitoring. The problem of radioactive waste disposal into the sea and the measurement of marine radioactivity has been the subject of extensive study and recommendations by the IAEA. Monitoring the quality of the environment on a global scale is, however, a relatively new concept which the world community has been forced to recognize as important by the consequences of the rapidly increasing pollution of that environment. However, for practical purposes it would be more feasible to develop monitoring by sectors (e.g., marine) and regions.

Purposes of monitoring

Any surveillance and monitoring system should be established with clearly defined objectives, even though it is recognized that these objectives will develop and change with time and experience. The

following are the minimum objectives suggested for worldwide marine and fresh-water monitoring:

To establish present-day baselines

This would include measuring the concentrations of several critical pollutants in the water, in the organisms and in the sediment of lakes, rivers, streams, estuaries and the ocean. It would then be possible to evaluate the aquatic transport of pollutants to the sea; atmospheric transport of pollutants would require a different monitoring system.

To detect and evaluate trends of change

Continuous monitoring will tell which pollutants are increasing with time and will also assess the effectiveness of corrective measures. In most cases it is the trend of pollution which is of greatest concern, because where it has been measured it has been shown to be increasing rapidly.

To give advance warning

When any pollutant tends to increase in the environment, the monitoring system should provide advance warning of approaching critical conditions. As mentioned previously, the aquatic ecosystem has a considerable capacity to recover from many types of added pollution, but when this capacity to recover is exceeded the system can break down catastrophically. With experience it should be possible to anticipate the time when critical events will occur by analysis of the trends of change. A prediction that the ecosystem is approaching a critical level with regard to any given pollutant would give warning that remedial action is necessary while there is still time to take appropriate action.

To detect accidental critical events

The monitoring system should be capable of quickly evaluating any accident that releases unusual amounts of a pollutant into the environment. Such accidental releases can provide information on the levels which can be tolerated by the environment, including its living organisms, and by continued observation it would be possible to evaluate the rate of recovery of the environment from the particular pollutant involved. This type of information would be valuable in determining precisely the critical levels of the pollutant for a given environmental situation.

Information, storage and retrieval

To achieve the above objectives an efficient means of storage and retrieval of data will be essential. Only in very few exceptional cases will the information be required in real time, for example when accidental discharges of a pollutant (e.g., oil) occur. In the majority of cases the frequency of sampling and submission of information can be less expeditious. For reasons of economy, the use of existing systems should be encouraged.

Monitoring techniques and systems

Operating surveillance and monitoring techniques and small-scale systems are available in some countries, but few are sufficiently equipped to achieve the objectives outlined above. Monitoring techniques can range from an occasional spot check of a particular characteristic to a continuous recording of the same property. Some types of monitoring have to be done at a fixed station or laboratory; others could be done by teams travelling from place to place and applying the same methods of measurement to a variety of environmental conditions. Other characteristics of the environment may be detected by remote sensing from aircraft or satellites. As monitoring feasibilities improve, for example, by the development of more precise and sensitive methods of chemical analysis, the system should be capable of adopting the best measurements available to achieve the precision required for proper evaluation of the state of aquatic environment and organisms, and for management purposes. In some cases, however, a rapid though less precise method of analysis may be preferable to a time-consuming or rather expensive method of great accuracy and precision.

To evaluate the sources of pollution, statistical information about the production, use and disposal of critical items is needed. In some cases, these activities may be variable with time; in others annual average values may be satisfactory. Only when the source terms are known, however, will it be possible to approach a balance sheet for a given pollutant in the environment so that trends can be predicted in advance rather than waiting for the event to occur. For most pollutants, as the preceding discussions show, this type of information is more readily available than some of the other information required. It may be that no additional organizations or structures need be created for this purpose, but existing institutions and systems certainly need strengthening to cope with these new demands.

Precise chemical monitoring of the aquatic environment will be an integral part of any pollution monitoring network. In recent years great advances have been made in chemical methods for the isolation, identification and measurement of both inorganic and organic compounds, sometimes by using automatic devices. With proper sample preparation these are applicable to water, biological material and sediments. These methods are satisfactory for the monitoring of most of the pollutants discussed in this paper. New and more sensitive methods will certainly be available in the future,

but even now the main difficulty with these complex techniques is that the costly equipment required limits pollution studiesto a relatively few laboratories in the developed countries. Continuous standardization and intercalibration of methods will be necessary to assure comparability of results obtained in various laboratories.

Physical means of monitoring include radioassay and radioactivation techniques, optical methods and photography in the visible, infrared and ultraviolet ranges of the spectrum. Infrared scanning photography, radar and microwave photography all offer promise for global monitoring from aircraft and satellites. Heated effluents and the distribution of turbidity and other discoloured waters can be readily detected and mapped by these methods.

A network of stations will be necessary to achieve the objectives of the monitoring programme. It has been suggested that two kinds of locations will be necessary: some, called " base-line stations," should follow large-scale changes, particularly of pollutants carried great distances in the oceans, and should be remote from direct influences of human activities. Mid-ocean islands and oceanic areas in high latitudes would be suitable. Others, called " impact stations," should be located near the sources of pollutants, in major fishing areas or in vulnerable areas such as coral reefs and mangroves. They would follow the trends of pollution increase and evaluate the effects on the marine ecosystem and fishery resources.

As the effect of pollution on living aquatic organisms is a major concern, collection of data on biological components must be an essential part of any monitoring system. Sessile plants and animals are continuously exposed to the environment and consequently will integrate over time the continuous exposure to a pollutant. Since organisms are capable of concentrating some pollutants within their bodies to levels higher than those in the surrounding water, they can also serve as a more sensitive indicator of pollution than water analysis alone. Analysis of a variety of species will show the pathways and points of accumulation of pollutants and toxins in the ecological system. Analysis of changes in population sizes or in the structure and characteristics of the community will permit evaluation of the long-term, sublethal effects which cannot be detected by chemical analysis of the water.

Plans for biological monitoring should include international surveys; networks of ecological baselines; and the use of biological organisms as sentinels or indicators for the long-term biological assay of man-produced contaminants and changes in the environment.

International biological surveys should be made in various parts of the globe, and should be designed to compare the state of populations and the health of species in the aquatic ecosystem, including levels of contamination. In terms of fish-stock potentials and harvests this is already being done by FAO. It would be advantageous to have additional information on the lower organisms in the food chain which sustain the economically important species of fish. Also, these smaller organisms may well be more sensitive to pollution than the adult fish and changes in their population size or community structure could give advance warning of later effects on the fish population. These surveys could advantageously be conducted during critical periods in the life cycle of the organism (e.g., breeding, egg and larval production or migrations of species).

The international biological surveys would enable an evaluation of the present-day base-line, but it is equally — and perhaps more — important to know the trends of change in these base-line conditions. The results of the surveys might well identify critical areas of the aquatic ecosystem which should be monitored on a continuing basis. For efficiency and economy this network of stations should as far as possible be the same as that used for physical and chemical monitoring. This would permit the correlation of the chemical concentration of the pollutants in organisms with the biological changes in the population and communities. In selecting the locations of these stations consideration should be given to the sources of the important pollutants and the mode of delivery to the monitoring locations (i.e., whether by river or by atmospheric transport).

The many species of plants and animals which are unusually sensitive to pollution can be used as "early-warning,, sentinels for particular pollutants. There is a need to identify aquatic organisms which will perform the same kind of service for the environment as does the coal-mine canary for miners: its death warns them of the presence of toxic methane gas. The structure of the biological community itself may also serve as an early-warning system in that as pollution increases, the more sensitive organisms in the community disappear, species diversity declines and stability decreases. In this type of monitoring, there would be advantages in placing emphasis on the bottom populations, which, as they are mostly stationary, can be expected to integrate the effect of long-term exposure to pollution.

Attempts to organize monitoring systems

The monitoring of fresh water bodies has long been practised for the purpose of checking the safety of water used for domestic purposes. The recording of the flow of water and water-level fluctuations now covers most inland water in developed countries.

Until recently most monitoring was done manually, but now the need for more detailed information

makes more frequent sampling necessary and has led to the collection of large amounts of raw data which need to be synthesized by statistical methods. In this context the recent development of automatic stations connected to electronic computers for processing the data is of special significance.

Although monitoring of inland waters has mostly been a national undertaking, research problems often make it necessary to establish international cooperation, as for instance, in the Lake Constance Commission, the Rhine Commission and the Danube Commission in which various countries are participating in regional monitoring programmes.

In developing countries monitoring schemes have been established mainly in connection with the construction of dams for hydropower, and consequently only a few parameters (water flow, silt content) are monitored. In view of the changes in water quality that are expected to occur in these countries, there is an urgent need to begin the monitoring of at least the major rivers and lakes in order to obtain essential background data.

Compared to the progress which has been made in monitoring of inland waters, marine monitoring programmes are only in their earliest phases. The environmental problems of the oceans are much more complex and difficult.

Individual laboratories or small-scale marine monitoring programmes have been developed on an *ad hoc* basis by various countries that have been concerned about the increasing rate of marine pollution in their offshore waters. Such programmes refer mainly to pesticides, heavy metals, oil and bacteriological pollution and are used for warning fishermen or inhabitants of the coasts in cases of actual risks to human health and property. Radioactivity has been monitored for many years through a scheme of close international collaboration, and this scheme has provided most valuable experience for future programmes.

Some countries have already established collaboration in this field, either on bilateral or multilateral bases (e.g., the Scandinavian countries) or through existing regional bodies like the International Council for the Exploration of the Sea (in connexion with the pollution of the North Sea and the Baltic).

The necessity of establishing a marine monitoring system on a world-wide basis has been recognized by various national groups and by some nongovernmental organizations having responsibilities in the field of oceanography and marine resources research. Preliminary studies and plans have been developed in this regard by the advisory bodies to the Intergovernmental Oceanographic Commission (IOC), namely, the Scientific Committee on Oceanic Research (SCOR) and FAO's Advisory Committee on Marine Resources Research (ACMRR), which are contributing to the plans for the worldwide marine monitoring system envisaged to operate within the global environmental monitoring framework under preparation by the Scientific Committee on the Problems of the Environment (SCOPE).

As the operation of such a system will imply systematic sampling in agreement with established patterns and procedures and exchange of relevant data, and also because of the considerable costs involved, governments will need to play an important role. The necessary international mechanism would best be achieved by entrusting the responsibilities to an intergovernmental body. This has already been expressed by various governments and organizations in connexion with the preparations for the United Nations Conference on the Human Environment to be held in Stockholm in 1972.

Reference has been made to the possible role which could be played by the Intergovernmental Oceanographic Commission, especially taking into account its programme for the Integrated Global Ocean Station System (IGOSS) which could be expanded to include some relevant observations required for the monitoring of marine pollution.

It has been proposed that as part of the Long-term and Expanded Programme of Oceanic Exploration and Research (LEPOR), developed in response to a request by the United Nations General Assembly, a programme of Global Investigations of Pollution in the Marine Environment (GIPME) be organized in order to provide a basis for the design of such a monitoring or surveillance system and its use for many purposes related to the protection of the marine environment and of its resources.

In the course of the preparations for the United Nations Conference on the Human Environment the view has been expressed that the IOC should be the international organization coordinating ocean monitoring programmes, and that it must therefore possess adequate facilities and resources and that, because they are multidisciplinary programmes, effective coordination must be maintained between the Commission and the specialized agencies of the United Nations system supporting these programmes. This is at present ensured by the Intersecretariat Committee on Scientific Programmes relating to Oceanography (ICSPRO), consisting of executive heads of the United Nations agencies, or their appointed representatives, who have agreed to sustain the work of the Commission through relevant parts of the programmes of their respective organizations and to use the Commission as appropriate for advice and review in the area of marine science.

Another good example of fruitful cooperation is the joint sponsorship by IMCO/FAO/UNESCO/WMO/IAEA and the United Nations of a Group of Experts on Scientific Aspects of Marine Pollution (GESAMP) to

advise them and the IOC on activities of common interest.

From preliminary studies and consultations there seems to emerge a clear view that a worldwide marine monitoring system can be better achieved step by step, starting with existing national programmes, and in some areas through regional schemes. This should first cover seas having a risk of heavy pollution, such as the North Sea, the Baltic and the Mediterranean, and these schemes could serve also as pilot exercises of great value for the establishment of similar schemes in other areas (e.g., the Persian Gulf).

All nations should, in the long run, participate in monitoring of aquatic pollution for the proper protection and use of living resources and adequate management of the environment. Many developing countries lack the facilities and specialized personnel for this purpose, and it is the duty of the international community to assist them to develop their economies and industries without damaging the natural resources and environment. There is, therefore, a great need for technical assistance through both bilateral and international programmes, and activities in this sector need to be further intensified.

Means of reducing pollution

In discussing reduction of pollution, it has to be emphasized that the pollutants should whenever possible be removed at the source, where they are most concentrated. After they are released to the water and diluted, removal becomes much more difficult and may even be impossible. An upstream polluter can greatly increase the cost of water treatment for domestic or industrial use downstream. The downstream residents should not be forced to pay the costs saved by the polluter. Marine currents also move pollutants from high seas to coastal areas or carry them along the shores of neighbouring countries.

Waste treatment should always have as an objective the recycling and reuse of the pollutant and, when necessary, of the water itself. Recycling may never be 100 percent effective, but if substantial amounts can be recycled it will be of benefit to the environment, and in some cases, the recovered material may result in a profit. Even if there is a net cost involved, recycling will be required to protect the environment and preserve our dwindling natural resources.

Preventive and curative measures

Even when agricultural, industrial or urban development is undertaken on the basis of plans, it may not always reflect the common good. The individual entrepreneur is usually primarily concerned with gain to himself, and he usually tries to avoid for as long as possible expenditures on items such as the prevention of water pollution which may reduce profit. In other situations aggressive industrialization by state enterprises has led planners to neglect the inevitable damaging consequences to the environment.

Development of urban areas must often satisfy many conflicting interests, and since resources are limited, priorities should be identified. Until recently there have been few regulations intended to prevent water pollution — a reflection of the low priority given to this aspect of planning.

When protection of water against pollution is recognized as being of high priority, and especially when it becomes apparent that preventive measures are much cheaper and more effective than remedial measures, much can be achieved at the planning stage. Planning begins with the locating of industries or new urban areas and continues into the design and operation procedures. To give water protection, and especially the protection of fisheries, its proper weight in planning, it is necessary to establish adequate scientific bases for management and appropriate regulations and to recruit well-informed administrators for their implementation. In the industrialized countries, the results of insufficient planning are now painfully obvious, and for new undertakings high priority should be given to the prevention of freshwater and marine pollution. In developing countries, pressing needs for the housing of growing urban populations and for the creation of industries often cause planning authorities to overlook environmental effects.

Industrial wastes are increasingly being mixed with domestic sewage, and furthermore, many new materials in use in homes find their way to the sewage system. The volume of water used per caput in households is rapidly increasing while the quantity and quality of recipient waters at best remain constant. These factors all influence the design of sewage treatment plants.

In primary treatment the sewage is led through a basin sufficiently large to permit suspended organic matter to sink to the bottom. Recent developments aim at increasing the efficiency of such treatment by optimizing the hydraulic properties of the basin. This method is acceptable only where extremely effective dispersion of the effluents occurs in the receiving water.

In biological treatment, optimum conditions are provided for the natural self-purification processes in lagoons by trickling filters or by the activitated sludge method.

Recent developments aim at increasing the removal of phosphates and other substances which occur in low concentrations, but can have important effects in receiving waters. Chlorination of biologically treated water can achieve total elimination of bacteria.

Chemical treatment has long been used for industrial wastes and for treatment of water for human consumption. Recently it has come into use also for treatment of domestic sewage in order to remove phosphates, heavy metals and other pollutants.

Treatment of agricultural wastes from large mechanized farms has only recently been recognized as a problem. At the present state of knowledge it seems that the established method of spreading the wastes, manure and ensilage effluents on farmland is still the most suitable one. The wastes should be collected and stored until they can be spread on land in quantities depending on the soil conditions. Ploughing of fields after spreading of wastes decreases the rate of runoff to surface waters. For very large farms the volumes and areas needed make this method uneconomical, and more advanced means of treatment may be necessary.

Emergency remedial measures

When water-soluble pollutants are released into the environment, the opportunity for remedial action is lost because of dilution. Even when diluted to the extent that its removal is no longer possible, a highly toxic material may still be a hazard to public health and to living resources. The only effective remedial action is to ban the use of the water for drinking purposes, but usually there is no practical way at that stage to prevent damage to aquatic organisms and fish farms.

Accidental discharges of oil can be cleaned up by several methods, but as with all pollutants, the only effective measure for controlling contamination by oil of the aquatic environment is the prevention of avoidable spills and releases. The time lag between a spill and the cleaning up means that some damage will inevitably have occurred before the corrective measure can take effect. For example, the soluble parts of the oil will already be in the water and will not be removed by any of the presently known methods of cleaning up after the spill.

Probably some of the earliest clean-up methods for spilled oil were to gather and remove or to bury the material that came ashore on the beach and to disregard the oil which did not come ashore. It was soon discovered that the use of straw to absorb the oil made the cleaning of beaches easier, and this is still pobably one of the most common techniques. In cleaning up the oil spilled from the *Arrow* (Canadian coast), peat moss was found to be more effective, since it absorbed more oil per unit weight than any other material tested.

Detergents and dispersants have also been used extensively to clean up oil slicks floating on the sea surface. The detergents used in the cleanup after the *Torrey Canyon* accident were themselves dissolved in the solvent and were more toxic than the crude oil alone. However, less toxic dispersants have been developed since that time. One bioassay test carried out by the Department of Natural Resources of Michigan (1969) found that the least toxic detergent mixed with oil could be a hundred times as concentrated (1 800 ppm) as the most toxic one (14 ppm) for the same toxic biological effect.

The use of detergents is essentially a cosmetic one — that is, it removes the obvious evidence of oil — and consequently is of great appeal to the polluter. However, after treatment with detergent, the oil is dispersed in the form of fine droplets and becomes even more available to the biota of the sea than it would be if it were left in the form of a surface film. Because of the finer degree of dispersion, the soluble toxic fractions dissolve more rapidly and reach higher concentrations in sea water than would result from natural dispersal. The droplets themselves may be ingested by filter-feeding organisms and thus become an integral part of the marine food chain. Some of the oil may pass through the gut in the faeces of these organisms, but Blumer (1970) has shown that it can pass through the gut wall and be incorporated in the lipid pool of the organism. It can thus be transferred from organism to organism and could eventually be incorporated into the food that man takes from the sea. Thus, although detergents can remove the visible evidence of an oil spill, they can also introduce the oil into the marine biota in a way that has a more severe and more prolonged effect than the untreated oil.

Sinking of the oil has also been achieved by scattering talc or chalk on the surface and causing the oil to agglutinate into globules of greater density than sea water. This sunken oil may kill the motile bottom dwellers before they have time to move away. The sessile forms of commercial importance such as clams, oysters and scallops cannot escape, and some motile species such as lobsters may actually be attracted to the spill, where the exposure will contaminate or kill them. Little is known about the rate of degradation of oil in bottom sediments, but some fractions have been seen to persist for well over a year.

Extensive efforts were made to burn the oil in both the *Torrey Canyon* and in the *Wafra* (wrecked off the cost of South Africa in 1971). If oxidation

is complete, the oil is converted to carbon dioxide and water and no longer remains as a pollutant; but incomplete combustion is far more common, and the smoke and volatile oils released in the burning become atmospheric pollutants and ultimately return to the sea through precipitation and accumulation on the water surface. Moreover, burning the oil within a tanker is a difficult business, and has not been successful even when oxidants were added. Volatile fractions may burn off quickly, but most of the oil resists combustion. It is even more difficult to burn the oil after it has accumulated on the sea surface, though this has been attempted by the use of wicks and small glass beads to which the oil will cling and be protected from the quenching effects of the water. During the burning process, the elevated temperature increases the water solubility of the most toxic components, which can lead to greater biological damage than if the oil had been left unburned.

Mechanical containment and removal of oil appear ideal from the point of view of avoiding long-term biological damage. A variety of containing mechanisms have been proposed, such as booms or inflatable long plastic balloons with skirts extending a few feet into the water, and various types of surface skimmers to collect the oil and pump it into a standby tanker have been suggested. Unfortunately, most wrecks occur during less than ideal weather conditions, which makes delivery and deployment of mechanical devices difficult. Floating booms are relatively ineffective in a rough sea, since the oil can be carried over the top by splashing waves and as windborne droplets, but in protected waters such as harbours, recovery can be quite effective. Among the oil removal methods in use today, this is without doubt one of the most satisfactory when conditions permit.

Microbiological degradation, although a slow process, is the ultimate fate of all of the oil left as a pollutant in the sea. However, in the process of degradation many intermediate chemical compounds may be produced which can be as toxic as the original oil, and no single species of bacteria is capable of degrading all of them. A mixed bacterial culture which could be sprayed upon the oil slick could conceivably compensate for some of these difficulties and accelerate the normal decomposition process of the oil. As ZoBell (1969) has pointed out, hydrocarbons and other compounds in crude oil may be bacteriostatic or bacteriocidal in high concentrations, thus reducing the rate of degradation in those localities where it is most urgently needed. As mentioned previously, the oxygen requirement for the bacteriological degradation of oil is high; the oil would need to be greatly diluted to avoid removal of all the oxygen in the sea water. Perhaps a combination of the use of dispersants and seeding with bacteria could prove to be a useful technique.

Although an effective solution to the problem of cleaning up oil spills is desperately needed, it is obvious that the best solution is prevention. When wrecks occur, every effort should be made to offload the oil before it enters the marine environment or to pick up the oil from the sea surface as soon as possible after it is released. The difficulty of doing this under severe weather conditions is obvious, and furthermore, many countries are not equipped for dealing with these accidents. It has been suggested that an international scheme should be established to assist in such emergencies, possibly through the formation of international task forces with adequate personnel, equipment and facilities of rapid transportation, which could assist the governments of affected localities on request.

Oil spills which occur in harbours during the process of transfer of oil to the refinery or of refined oil to the tanker should be able to be more easily controlled. During loading or unloading operations each tanker could be surrounded by a portable boom which would confine the oil and make possible the recovery of most of any spill. As mentioned earlier, present technology is adequate to prevent most of the accidental spills from offshore well drilling or operations. It is only necessary that certain precautions be faithfully observed.

Administration and legal aspects of aquatic pollution

National administration

Over the last 25 years or so many countries have radically reformed their administration and legislation for the control of water pollution. Previously, the approach to the problem was characteristically a patchwork of competing jurisdictions as ineffective as it was confusing, with many separate agencies handling different aspects; and in the lack of unified control, the interests of health and fisheries were swamped by those of industry.

Thus most of the recent reforms (at least so far as inland water pollution was concerned) took as their main objective the creation of comprehensive

systems of water quality management and the development of resource-oriented, rather than use-oriented, systems in which all legitimate interests in the use of the water resource could be balanced on the basis of sound scientific and other relevant considerations. One important element of these reforms is the centralization of powers of planning, direction and coordination in national agencies which operate independently of sectoral interests (but in which these interests are represented) and as an integral part of the management of water resources and the protection of the environment as a whole. Such centralization is important to avoid excessive regional variations in pollution control measures as a result of competition for industrial expansion and to give weight to water-quality management considerations in the formulation of national policy. The administrative reforms have also been characterized by a tendency to treat the drainage basin as the basic administrative unit within which the various interests in the water usance must be reconciled from the point of view of water quality management. The German cooperative associations, the United States interstate river pollution control agencies, the English river authorities, the French river-basin committees and the conservation authorities of Ontario, Canada, are all examples of this trend. The trend itself is soundly based, since it is within these natural units that most of the conflicts of the use of water resources will normally lie, although in many countries it may not be possible or desirable, for lack of the necessary personnel, scientific equipment and funds or size of the basin, to establish an autonomous or semiautonomous authority for each river basin.

Despite the recent spate of organizational reforms, however, many countries still lack effective water quality management administrations authoritative enough to represent and harness together the interests of health, tourism, recreation, fisheries and agriculture in the face of the expediencies of industrial and urban expansion. Even in those countries which have introduced the most far-reaching reforms, recent reviews have suggested the need for further radical organizational reforms to strengthen the authority of pollution control bodies over both public and private polluters.

Inland, estuarine and coastal water pollution are of course closely interrelated. The fact that until recently fresh water pollution was the dominant problem, and offshore pollution was not yet critical, is still reflected in some countries in their treatment of estuarine and territorial waters as an extension of inland waters under the authority of the same administrative bodies for the purpose of pollution control — at least so far as pollution emanating from coastal establishments is concerned. In many cases, however, it appears that this extension of theoretical jurisdiction has not been followed up by any practical and effective exercise of authority. The situation is changing because coastal waters are becoming more and more heavily affected by disposal of wastes (particularly dumping) in offshore areas and by oil spills.

These other sources of pollution affecting the marine environment generally fall within the competence of functional departments: pollution from shipping is normally handled by ministries responsible for navigation; pollution resulting from the exploration and exploitation of the continental shelf by ministries of power, or mines; pollution in harbour areas by harbour authorities; and problems of radioactive pollution by authorities responsible either for nuclear power or for public health. Such a division of control over the quality of water is of course encouraged by the juridical division of the seas into various zones of national and international jurisdiction.

Until recently little or no coordination of such management and control measures was generally apparent; those national bodies that did exist dealt mainly with the specific problem of oil pollution from ships. Recently, however, the need for overall coordination of marine pollution management measures at the national level has been recognized and more adequate mechanisms were established or are envisaged.

National legislation

In many countries little or or national legislation exists for the control of water pollution, either inland or marine. Where control does exist, it is often scattered and piecemeal, reflecting the response to specific problems as they arise. Thus pertinent articles may be found in fisheries laws, in sanitary codes and regulations, in legislation controlling the activities of certain industries or establishments and in a host of other local laws.

However, the radical reforms of the last few years have inspired in many countries comprehensive pollution-control laws that seek to transcend sectoral interests and, by a system of balancing interests, to maintain the quality of the water resource at a level suitable for the various uses required of it. The identification of actual and potential uses of particular bodies of water and the according of priorities to particular uses is in some cases achieved through a formal process of investigation and classification of those bodies of water and in others more informally, through the everyday functioning of licensing bodies in which the various classes of users are represented.

In some countries standards of water quality for each particular use or classification have been established through legislation on a nationwide basis; but this has often given rise to objections that in the process of formulating standards fisheries interests have not received the attention they deserve. With the resurgence of scientific research on water-quality criteria for fish, a better understanding of the ecological basis for fishery resources and aquatic environment management, and the setting up of pollution control agencies independent of sectoral, industrial and limited health interests, the situation may be expected to improve.

In other countries the whole concept of fixed standards for both inland and coastal waters has been shunned as leading toward a decline in the quality of waters to the lower limits of the standards and a more flexible approach to water quality is preferred.

In maintaining the standard of quality of a particular body of water, most industrialized nations now rely to some extent on a permit system, whereby all discharges must be authorized by the pollution-control body and conditions for effluent siting, quality and quantity are established for each user. Similar rules are also being developed for the control of waste disposal, by dumping or other forms of discharge, in coastal and oceanic areas. Recently the tendency has been toward integrating environmental considerations into the development process at the planning stage.

Bringing environmental considerations into the planning of development processes, particularly those involving industry, is also one of the main objectives of some of the new financial measures adopted in several countries. In addition to tax concessions to industry and financial assistance to municipalities for the establishment of waste treatment facilities, an increasing number of countries are now turning to the idea of charges related to the nature and quantity of effluent discharged and, in the more complicated systems, to the nature of the receiving waters and the uses adversely affected by the discharges. The idea, in the economists' language, is "to internalize the external diseconomies" — or in other words, to make the polluter pay for the damage he causes to others.

Another significant trend in modern pollution-control legislation is the development of controls over the products that cause contamination and the encouragement of processes that diminish pollution. Examples of the former can be seen in the legislation fixing limits of minimum biodegradability for detergents and in the exercising of controls over pesticides and the lead content of gasolines. An example of the encouragement of pollution-curtailing processes is the recent change in the United States Federal Government's purchasing specifications requiring a minimum recycled content for paper purchased by federal agencies. Although of only indirect effect on water pollution, this measure may set a precedent for the encouragement of other types of waste recycling.

Some countries, as part of their established traditions, and as mentioned before, deal with pollution of territorial waters under the same general system and legislation as inland water pollution, although neither the standards of environmental quality required nor the effectiveness of implementation of pollution control measures are necessarily the same.

As far as other sources of pollution of the marine environment are concerned, the present situation is essentially one of fragmented user-oriented legislation restricted in its application by the current rules of international law to the territorial waters of the state or to ships flying its flag. But in recent legislation two trends can be discerned which (*a*) may extend national pollution-control jurisdiction beyond the traditional limits of the territorial waters of the state and (*b*) at the same time bring together, as far as possible, the present fragmented legislation into a coherent whole under a single administration. As examples of the first trend may be cited the recent legislation extending states' territorial waters to distances of up to 200 miles (and thus incidentally also extending the area of pollution control jurisdiction), the national legislation implementing the 1969 International Convention relating to intervention on the high seas in cases of oil pollution casualties, and the recent Canadian legislation extending Canadian pollution control jurisdiction over large areas of the Arctic waters well beyond the traditional limits of Canadian national jurisdiction. The second trend may be seen in the Finnish Act of 1965, which provides a framework of law of the control of marine pollution from ships, land or continental shelf, and some of the recent Canadian and United States legislation on marine pollution.

A further example of the physical extension of national pollution-control jurisdiction is provided by the recent legislation and proposals of legislation for the control of dumping wastes at sea. At the present time such provisions as do exist in national legislation for the control of dumping are limited for the most part to the territorial waters of the state. Once outside these limits dumping barges are generally free from all restrictions. Such untrammelled licence to pollute has, of course, attracted sharp criticism and it seems likely that some restrictive measures may be put into effect in the near future. Already Finland has broad provisions restricting dumping from Finnish ships and the Netherlands has recently sought to control dumping from

all barges sailing from its ports. Similar legislation has now been proposed in the United States, the United Kingdom, Sweden, Norway, Denmark and Iceland.

International aspects

Neither problems of pollution in international rivers nor those of marine pollution can be settled by national action alone. As waters cross national frontiers, so do problems of water pollution; and as the resources of the oceans lie beyond the control of any one state, they can be effectively managed only by international cooperation.

Aquatic pollution is, therefore, a subject of concern to numerous international organizations, both intergovernmental and nongovernmental, with global or regional responsibilities. Within the United Nations family, various organizations are dealing with aspects of aquatic pollution that come within their terms of reference. In the case of FAO, these are the effects of pollution on living aquatic resources and fisheries, and with related environmental aspects. The United Nations itself has a special responsibility for the overall political and legal aspects and is concerned with the human environment and the law of the sea in general.

Coordination of activities in the assessment and prevention of marine pollution is provided by the normal United Nations machinery, especially the Advisory Committee on Coordination and its Subcommittee on Marine Science and its Applications, and in part and for technical aspects by the Inter-Secretariat Committee on Scientific Programmes Relating to Oceanography (ICSPRO), formed by the agencies providing support to the Intergovernmental Oceanographic Commission.

The United Nations regional economic commissions and organizations such as the Council of Europe, the Council for Mutual Economic Assistance (COMECON), the Organisation for Economic Co-operation and Development (OECD), all have programmes related to regional aspects of aquatic pollution.

Some other bodies have more specific technical responsibilities, as the International Council for the Exploration of the Sea, which prepared the scientific basis for a convention dealing with marine pollution in the North Sea, or the General Fisheries Council for the Mediterranean, which is reviewing the situation in its area in view of future action by the governments concerned.

One of the first international commissions charged with functions of fresh water pollution control was the International Joint Commission set up in 1909 under the Boundary Waters Treaty between the United States and Canada. More recently, greater regulatory powers, including those to set and enforce standards of water quality and to operate projects and facilities, have been given to interstate river commissions in the United States and Australia. Although not strictly international, the experience of these interstate bodies has been of relevance in the establishment and development of international bodies in other parts of the world. The international river pollution-control commissions of Europe and Africa, many of which have been established or restructured within the last two decades, have less comprehensive powers. Indeed, the emphasis on the work of the European commissions seems to be more on technical matters preceding control measures than on the establishment and supervision of control systems, although the commissions do have powers to recommend measures for pollution control to member governments. One factor inhibiting the development of these commissions is perhaps in that only one of them, the Rhine Commission, is assured of the assistance of its own technical secretariat.

No international commissions for the overall control of marine pollution as yet exist. Such international conventions as have been concluded have, in the main, been limited to treaties for the control of pollution by oil and by radioactive substances. Some general provisions exist also in the 1958 Geneva Conventions on the law of the sea.

There were attempts to bring about international control of oil pollution from shipping as long ago as 1926, but it was not until 1954 that the first International Convention for the Prevention of Pollution of the Sea by Oil (the so-called London Convention) was signed. As it now stands (it was amended in 1962 and the amendments entered into force in 1967), the London Convention prohibits within certain zones the discharge of oily wastes by merchant ships over a certain size and by all new ships over 20 000 tons. Under further amendments adopted in 1969, but not yet in force, the basic concept of prohibited zones would be removed from the convention and all discharges over a certain specified amount would be prohibited. Even as amended, however, the convention still suffers from certain deficiencies in enforcement, occasioned mostly by the difficulties of monitoring and by the fact that while the interest in enforcing the prohibitions on discharge lies with the coastal state affected by the discharge, the powers of enforcement lie with the flag state.

Some of the gaps left by the London Convention — which were emphasized so glaringly by the *Torrey Canyon* disaster — were covered in two further conventions signed in Brussels in 1969. The first of these empowers coastal states whose coastlinee, living marine resources, wildlife, etc. are threatened by the

danger of oil pollution from a ship involved in an accident at sea to take action against that ship to avert or mitigate the threat. The other convention places strict civil liability for damage caused by oil pollution on the ship owner. The Brussels Conference also recommended the setting up of an International Compensation Fund before the end of 1971 to ensure adequate compensation for all victims of oil pollution damage.

The *Torrey Canyon* disaster also emphasized the desirability of cooperation between countries threatened by a particular spillage of oil. The Council of IMCO called for the establishment of regional schemes of cooperation, and the first of these was set up by eight countries bordering the North Sea in 1969.

The Law of the Sea Conventions (Geneva, 1958) added little to the 1954 London Convention except the inclusion of pipelines and exploitation of the resources of the sea bed in the list of sources of oil pollution to be guarded against. The Geneva Conventions, however, also dealt with pollution of the seas by radioactive substances and committed states to take preventive measures against these and other harmful agents. No other treaties have dealt expressly with the problem of regulating radioactive contamination of the sea on a global scale, except perhaps for the 1960 International Convention for the Safety of Life at Sea which dealt with some of the problems of the carriage of radioactive goods as cargo and safety on nuclear-powered ships. There have, however, been several conventions during the last ten years dealing with the question of civil liability for damage caused by nuclear incidents and assigning strict liability to the nuclear operation. At the regional level, something more positive has been accomplished, notably among the EURATOM nations. Under the treaty of 1959 the member countries of EURATOM set up a system for the setting, maintaining and enforcement of maximum standards of permissible contamination in the air, soil and water of the member nations. The system also involved the submission to a central commission of information concerning waste disposal operations well in advance of their execution to allow the Commission to consider the effects of the operations and make recommendations to the States in question.

A further regional agreement that is of interest for both inland and marine pollution control is the European agreement on the restriction of the use of certain detergents in washing and cleaning products, opened for signature at Strasbourg in 1968. The agreement sets a minimum limit of 80 percent biodegradability for detergents and requires the signatories to take measures to prevent the sale of products not conforming to that limit. The importance of this agreement lies perhaps as much in its example of international action to control products that cause pollution as in its actual effects on water pollution.

At present there is much lacking in the machinery and conventions necessary for the control of water pollution; but given the increasing awareness and concern of the world community — both governmental and popular — and in view of the fact that at least four major international conferences have been or will soon be dealing with the problem,[5] the prospects are hopeful that positive action will be taken to fill in the near future.

In dealing with inland water pollution the need is for new and strengthened international river commissions with the authority and technical knowledge to take effective measures of pollution control. Already studies of the structures of existing commissions have and are being undertaken and recommendations for their improvement being made. The work of such bodies as the European Inland Fisheries Advisory Commission on fresh water quality criteria for fish is helping to provide the basic scientific knowledge without which no such commission can function effectively.

In the area of marine pollution, the gaps are even larger, not only in international legal action but also in the scientific information needed to design and operate international regulatory machinery effectively. In this regard, the work of such organizations as IOC and its advisory bodies and participating agencies in designing mechanisms to evaluate the state of health of the oceans and to monitor them, as well as their work on the nature and effects of pollutants and of the marine environment itself is of particular importance. It would appear possible at least to establish as an immediate action some form of registration of dumping of toxic wastes and possibly other significant deliberate or accidental discharges on the high seas.

To judge from recent announcements, the countries bordering particularly vulnerable areas of the sea such as the Baltic, the North Sea, the Black Sea and the Mediterranean Sea appear to be developing more stringent and detailed regulation of marine pollution than is probably possible at present on a global scale. But it would also seem possible and desirable to establish in the near future some broad and general principles covering all areas of the sea and all sources of pollution within which such regional arrangements may develop, and to promote the research and monitoring required for effective management.

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[5] FAO Technical Conference on Marine Pollution and its Effects on Living Resources and Fishing (Rome, December 1970); United Nations Conference on the Human Environment (Stockholm, 1972); IMCO International Conference on Marine Pollution (London, 1973); United Nations Conference on the Law of the Sea (1973), including the problem of marine pollution as a main section.

Improved management of the aquatic environment, by methods that are already well understood, will result in the improvement of many aquatic ecosystems. If demands on the environment are permitted to intensify opportunistically and *ad libitum*, as they have in the past, many more aquatic communities will be subjected to intolerable stresses. Depending upon the value that society will in the future attach to the ecological well-being of its waters, new management priorities and methods will be introduced. As a result some waters will be maintained in, or allowed to recover to, near-virgin healthy states; others will be partially transformed; and still others may be utterly destroyed to permit some form of intensive use or simply to serve as cesspools or sewers. Alternative options should be weighed as carefully and rationally as possible.

With increased human population growth and industrial development, there is no way at all of preventing an increase in wastes (including waste heat), although temporarily — that is, for the next decade or two — the total amount can be reduced by exerting great efforts toward improved efficiency. After that, options relate only to the form that the wastes will take when they are released, and where they should be released into the environment. Presumably technological methods, including recycling, will be increasingly applied to prevent most wastes from entering aquatic environments, except perhaps in the form of plant nutrients and waste heat released in carefully selected places where they will enhance the value of that environment.

The task of developing aquatic ecosystems for greater protein harvests is now less hopeful than that of ameliorating pollution effects. Increased fishing along conventional lines to cover all presently exploitable stocks in the world's oceans can lead to a doubling of the present yields. No special technological difficulties need be faced, though difficult socioeconomic decisions will need to be taken, and the doubling in harvests will presumably occur within one generation. If by that time we understand enough of the ecology of aquatic communities and protein production, and if adequate national and international regulatory laws exist and are enforceable, then levels of yield may gradually be raised beyond a two-fold increase. The amount of increase possible under improved management is not predictable with confidence. It seems likely that many of our most valued stocks, such as tuna, shrimp and salmon, can be maintained at high levels of production only with intensive scientific and international management. A national or multinational fishery, left to its own unorganized devices, would soon reduce stock size and catches of such species to low levels and to its own economic distress, as can be illustrated by many incidents in the history of fisheries.

A completely *laissez-faire* approach to fishing would likely lead eventually to a condition in which a very large proportion of the catches would be of small, low-valued species. It is sometimes suggested that such species would have a much higher ecological efficiency, in terms of the proportion of photosynthetically-bound energy entering the fishery as a result of a postulated reduction in the length of food chains. But the evidence now available tends not to support the idea of a greatly enhanced efficiency under such conditions, in which case the doubling of production seems optimistic and moreover is associated with a relative change in total economic value which will likely be much less than two, and eventually less than one.

The future for fisheries seems to be one of endless monitoring, refinement of theory and careful management practices. What role the newly recognized environmental concerns will play in this process remains to be seen. Fisheries biologists have in the past generally been of a decidedly conservative cast of mind, trying desperately to save the stocks of valued species. Fisheries ecologists are now beginning to formulate and test models that seek to define a series of variables useful for monitoring and management within the context of the broad environmental values being assigned not only to certain species, but to entire communities and ecosystems.

Time is not on our side, and we have grave concerns for the future ecological state of fresh water and inshore marine communities as they relate to fisheries. Yet the technology exists to maintain most of these environments in a reasonably healthy state or to recover them for purposes of increased fish production — for the limited number of generations required to bring human population into balance and eventually to allow a new philosophy of life to emerge. Strong sociopolitical decisions must be taken very soon to control pollution in the ways outlined in the preceding sections. FAO, together with other agencies concerned, will continue to play an important role in working toward joint goals of fisheries development and environmental health. The universal approach to fisheries development, exploitation and management at the level of international fisheries commissions, including those under FAO, is basically conservative. Fisheries experts at the international level have laboured cooperatively for decades to develop organizational mechanisms on a worldwide basis for obtaining the

relevant biological, technological and economic data to provide meaningful indices of the state of stocks, of harvests, and of the general well-being of the fishery. Economic statistics are published annually; these and other data (ecological, oceanographic, etc.) have recently been analysed as part of the FAO Perspective Study of World Agricultural Development to provide an overview of the harvest potential of fish resources in the world's oceans.

Systems for collecting and primary processing of data and for drawing initial inferences have been decentralized to a large degree. International fisheries commissions are rapidly expanding their activities in these fields sometimes under the direct stimulus and guidance of FAO. All cooperating nations are being encouraged to extend and intensify such programmes to assist regional agencies in questions of development and management, and also to contribute to the store of information for the benefit of worldwide planning within the United Nations. The data collected and processed in the early stages of an agency's existence, whether national or international, are usually at a minimum level of detail and complexity. When the effectiveness of the mechanism is assured, higher levels of precision are obtained to permit more definitive analyses of the states of stocks, fisheries, and other factor.

As yet data collection and processing systems have not been developed to the point at which complex environmental matters at the level of fish communities can be adequately monitored, but there is no institutional constraint that would prevent a completely natural extension into such a context. Various indices that might be suitable for these purposes are already being discussed by fisheries ecologists. In some cases, the same indices could be used to monitor the joint effects of an ecosystem of both pollution and fisheries exploitation.

Until recently environmental and pollution monitoring systems have been developed more or less independently of the fish and fisheries monitoring systems mentioned above, though not independently of FAO. The environmental monitoring systems have been fashioned largely by oceanographers, limnologists, meteorologists, "pollution biologists," sanitary engineers and food technologists — the latter because of the possibility of disease and poisons being transmitted to humans through ingestion of organisms from polluted areas. Both the fisheries and environmental systems, each with ecological and economic aspects, are converging on the same broad problems at the level of aquatic ecosystems and related effects on the well-being of fisheries, and should be encouraged to develop, in addition to their present separate systems, a single system of variables at the ecosystem level for purposes of routine monitoring. There is now a high-priority need for joint action among pollution experts, fisheries ecologists and economists, and also for the use of common mechanisms to reduce costs and to increase efficiency.

Since its inception FAO has been developing means of extending insights and expertise on fisheries problems — from the very practical to the highly abstract — to interested workers the world over and in close collaboration with existing regional fisheries bodies. The approach to these educational and training aspects might now be extended quite naturally to include consideration of the effects on fish and fisheries of other demands on aquatic ecosystems within a broader environmental context.

Many national and regional fisheries development projects, supported by bilateral and international funds (particularly under the United Nations Development Programme), are currently being formulated, administered and executed with the assistance of FAO. The approach taken is generally a flexible, relatively open multidisciplinary one which tends to assure that all serious problems and all scientific, economic, social and technical insights can be given due weight.

Through various mechanisms such as the formation of technical working parties, sponsorships of symposia, participation in interagency conferences, use of expert consultants, and through other special arrangements with the world scientific community, FAO attempts to keep abreast of major environmental developments in the aquatic realm and often leads the way in defining and implementing new insights and practices. This has been notably the case with the science and technology of fisheries development and exploitation, and more recently there have been important initiatives in the study of freshwater and marine pollution and broader environmental concerns, keeping in mind particularly the special needs of developing countries. The major goal is toward an integrated balanced approach that seeks to conserve, and where possible enhance, the fishery resources while labouring to augment fish harvests for human consumption. In the long term these goals must have equal priority; neither one can be sacrificed for the other.

The immediate challenge is for humanity to define its long-term objectives for the aquatic environment and its communities as part of a steady and balanced economic development. National governments, industries and international agencies must look critically at plans that conflict with environmental values and must strengthen existing programmes and allocate resources to maintain these values. Ecologists, economists and workers in other sciences must clarify and extend the relevant theories and models from which are derived the efficient variables to be monitored in order to judge whether society's objectives are being met. Meanwhile, national and international institutions must further develop and

administer flexible data-gathering, processing and retrieval systems to enable the measurement of relevant variables and the efficient access to information. The results of objective analyses made on a world-wide basis can then permit the evaluation of the degree of success of programmes undertaken to satisfy the objectives of harmonious development and progress together with a rational use and management of resources and the environment. Society can then revise the broad objectives when necessary and so the cycle would continue.

Although in any broad attempt to bring together economic and social development needs, various environmental requirements and fisheries needs, there are a vast number of difficult conflicts to resolve, there would seem to be no reason why scientific insight, technological capability and the relevant institutional mechanisms cannot accomplish this within a reasonable time span. Given an adequate commitment by the world's people and governments, progress should be rapid; we must hope that it will be rapid enough.

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ANNEX TABLES

EXPLANATORY NOTE

FAO index numbers of agricultural, fishery, and forest production and trade

Production index numbers [1]

The indices of agricultural production are calculated by applying regional weights, based on 1952-56 farm price relationships, to the production figures, which are adjusted to allow for quantities used for feed and seed. The indices for food products exclude coffee, tea, tobacco, inedible oilseeds, animal and vegetable fibres, and rubber. They are on a calendar year basis and are therefore not comparable with the indices for crop years published in the 1966 and prior issues of this report.

For fishery production, quantities are weighted by the average unit values of fishermen's landings in 1957-59. For forest production, roundwood production is weighted by 1952-56 prices.

Trade index numbers

The indices of the volume of exports and imports of agricultural products are obtained by applying the 1957-59 average unit values to the volume figures for individual products.

Average unit values are calculated on a regional basis, using quantity and value data covering a minimum of 85 percent of the region's total trade in each product. The unit values for individual products are weighted by the average volume of trade in 1957-59.

Because of difficulties concerning exchange rates and the pricing of barter transactions, the trade of eastern Europe and the U.S.S.R. has been priced at the world average unit values.

The indices of agricultural trade were revised in 1968, and the present series are not comparable with the indices for earlier years published in the 1967 and prior issues.

As far as possible, the indices for trade in fishery and forest products are calculated in the same way as those for agricultural products.

Regional coverage

The regional grouping used in this publication follows the recently adopted "FAO country classification for statistical purposes." The coverage of the groupings is in most cases self-explanatory. It should be noted, however, that in line with the decision to divide countries into three broad economic categories (developed market economies, developing market economies, and centrally planned economies) Japan, Israel and South Africa have been removed from Far East, Near East and Africa respectively and are presented under the separate heading of "Other developed countries." For this reason, tables for the three regions are not always comparable with those shown in earlier issues.

Among other regions, it should be noted that western Europe is defined as including Yugoslavia, and the Near East as extending from Cyprus and Turkey in the northwest to Afghanistan in the east, and including from the African continent Libya, the Sudan, and the United Arab Republic. For China (mainland) no estimates are included until more complete date are available.

[1] For full details, including a list of weights, see FAO, *Production Yearbook 1970*, Rome, 1971.

ANNEX TABLE 1A. – WORLD:[1] VOLUME OF PRODUCTION OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
Agricultural products															
Wheat	202.25	197.92	229.05	219.67	221.66	211.92	237.75	217.63	251.64	241.38	284.07	270.80	305.48	286.95	286.58
Barley	70.64	64.47	70.44	68.56	77.87	69.95	84.21	86.67	93.66	89.66	100.03	101.75	113.60	119.22	120.04
Oats	61.09	57.72	60.92	54.80	57.20	49.14	48.62	45.63	42.52	44.70	46.63	48.75	52.21	53.15	52.92
Maize	148.69	149.40	162.03	178.23	186.23	186.74	188.78	199.52	192.03	201.26	215.89	238.44	225.17	237.80	230.86
Rice (milled equivalent)[2]	89.31	84.29	93.04	97.78	103.43	105.68	106.60	113.22	116.87	108.47	108.22	119.95	125.85	129.70	133.37
Sugar (centrifugal)	30.95	44.35	47.90	47.16	52.08	52.58	50.05	51.78	60.70	61.39	61.92	65.15	63.39	64.95	71.17
Apples[3]	16.24	10.25	21.27	13.95	21.03	14.91	19.42	18.26	19.20	19.09	18.70	21.63	19.94	22.04	21.19
Citrus fruit	18.29	18.59	20.02	20.79	21.06	23.25	21.09	22.58	24.90	26.55	31.01	28.40	32.98	34.08	35.18
Bananas	14.01	15.34	15.48	16.57	17.38	17.86	18.43	19.59	21.38	23.42	24.04	24.82	24.88	25.99	26.75
Olive oil	1.20	1.19	1.12	1.24	1.40	1.50	1.00	1.92	1.00	1.35	1.35	1.44	1.52	1.35	1.48
Soybeans	13.92	15.00	17.65	16.44	17.02	20.70	20.61	21.24	21.15	25.51	28.09	29.54	33.09	34.03	35.05
Groundnuts	10.20	11.36	11.68	10.88	11.96	12.53	13.41	13.58	13.97	13.69	14.10	15.01	13.44	14.26	14.78
Cottonseed	14.61	14.02	14.47	15.28	15.96	16.10	17.44	18.49	18.47	18.75	17.06	16.50	18.33	18.19	18.76
Copra	3.47	3.49	2.92	2.73	3.34	3.40	3.12	3.29	3.35	3.31	3.45	3.15	3.26	3.28	3.33
Total vegetable oils and oilseeds (oil equivalent)	18.22	18.11	19.11	18.26	19.97	21.41	21.66	22.73	22.76	24.35	24.87	25.49	26.61	26.92	28.56
Coffee	2.46	3.11	3.56	4.22	4.29	4.65	4.27	4.06	3.21	5.09	3.82	4.48	3.86	4.35	3.97
Cocoa	0.90	0.77	0.91	1.01	1.22	1.18	1.17	1.24	1.56	1.22	1.33	1.39	1.23	1.43	1.53
Tea	0.73	0.75	0.80	0.82	0.83	0.89	0.90	0.92	0.94	0.97	1.02	1.03	1.07	1.09	1.13
Wine	22.61	18.27	23.81	24.96	24.35	21.98	28.53	25.83	28.51	28.86	27.29	28.52	28.32	27.71	30.08
Tobacco	3.27	3.22	3.03	3.26	3.25	3.18	3.51	3.79	4.11	3.76	3.83	4.04	3.91	3.81	3.93
Cotton (lint)	8.00	7.57	7.82	8.36	8.68	8.71	9.55	10.09	10.11	10.24	9.31	8.88	9.87	9.78	10.05
Jute[4]	2.49	2.43	2.73	2.44	2.32	3.51	3.01	3.15	3.06	3.28	3.48	3.45	3.31	3.31	3.11
Sisal. henequen and other agaves	0.62	0.65	0.68	0.74	0.76	0.77	0.80	0.83	0.88	0.86	0.86	0.80	0.78	0.77	0.78
Wool (greasy)	2.26	2.22	2.36	2.51	2.47	2.52	2.50	2.57	2.53	2.54	2.62	2.65	2.74	2.74	2.72
Rubber	1.92	1.98	1.95	2.05	2.00	2.09	2.13	2.19	2.29	2.36	2.44	2.43	2.64	2.92	2.95
Milk (total)	307.47	318.49	326.46	331.59	338.98	345.23	348.45	346.40	352.24	367.39	376.24	383.98	391.85	394.06	395.70
Meat[5]	54.07	55.22	56.55	58.83	59.79	62.75	65.03	67.20	67.31	70.12	73.27	76.73	79.01	81.05	83.84
Eggs	10.99	11.42	11.69	12.19	12.52	13.07	13.35	13.44	13.99	14.32	14.78	15.67	16.14	16.82	17.64
Fishery products[6,7]															
Freshwater and diadromous fish	4.71	5.06	5.56	6.14	6.61	6.96	6.78	6.99	7.14	7.80	8.24	8.32	8.54	8.92	9.50
Marine fish	22.28	22.83	24.12	26.75	29.21	32.19	35.63	36.32	41.00	40.87	44.05	47.10	49.90	48.40	53.50
Crustacea. molluscs and other invertebrates	2.91	3.03	2.95	3.26	3.56	3.52	3.77	4.15	3.88	4.11	4.29	4.50	4.86	4.72	5.00
Seals and miscellaneous aquatic mammals	0.01	0.01	0.01	—	—	—	—	—	—	—	0.01	—	—	—	—
Miscellaneous aquatic animals and residues	0.36	0.31	0.21	0.17	0.20	0.20	0.24	0.22	0.24	0.21	0.10	0.18	0.14	0.09	0.15
Aquatic plants	0.45	0.54	0.52	0.51	0.58	0.69	0.79	0.69	0.64	0.72	0.75	0.90	0.88	0.79	0.85
Forest products															
Fuelwood[8]	781	796	789	792	774	779	785	812	826	832	834	828	826	830	835
Industrial roundwood[8]	927	915	915	974	991	978	1 000	1 012	1 072	1 089	1 110	1 137	1 159	1 185	1 200
Sawn softwood[8]	235.8	231.7	241.8	259.2	258.5	256.8	259.3	266.7	279.0	283.4	280.2	282.2	294.8	297.9	299.6
Sawn hardwood[8]	64.1	59.5	62.0	64.8	66.8	67.9	69.2	72.5	78.0	79.1	80.8	82.6	83.9	88.9	89.0
Plywood[8]	11.2	11.7	12.9	14.7	15.2	16.4	18.0	20.1	22.1	24.1	25.2	26.1	29.6	30.5	31.6
Fibreboard	3.3	3.4	3.7	4.1	4.4	4.6	5.0	5.4	6.0	6.2	6.2	6.4	7.0	7.4	7.7
Mechanical wood pulp	16.1	16.2	15.9	17.2	18.0	18.4	18.8	19.4	20.5	21.2	22.4	22.2	23.3	23.7	24.1
Chemical wood pulp	33.1	33.7	33.7	37.3	40.6	43.6	45.6	49.7	54.1	57.1	61.7	63.9	67.1	73.3	75.9
Newsprint	11.9	12.1	11.9	12.7	13.7	14.0	14.3	14.6	15.9	16.6	17.9	18.1	18.7	20.1	20.6
Other paper and paperboard	47.3	48.1	49.2	54.0	57.5	61.1	63.8	68.1	73.2	77.7	83.4	85.3	92.2	99.1	102.2

[1] Excluding mainland China. – [2] Paddy converted at 65 percent. – [3] Excluding centrally planned countries. – [4] Including allied fibres. – [5] Beef and veal. mutton and lamb, pork, poultry meat. – [6] World total including mainland China. – [7] Nominal catch (liveweight). – [8] Million cubic metres.

ANNEX TABLE 1B. – WORLD:[1] VOLUME OF EXPORTS OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
Agricultural products															
Wheat and wheat flour (wheat equivalent)	31.75	29.56	27.68	29.37	33.29	40.83	36.92	45.19	54.46	53.78	56.45	45.94	44.35	41.21	50.65
Barley	7.04	6.35	6.50	6.18	4.93	6.19	5.62	5.05	7.18	5.91	6.04	6.66	5.71	6.13	9.83
Maize	5.79	7.07	8.80	9.99	11.12	12.47	17.49	19.08	20.08	23.43	24.72	25.70	27.95	25.60	27.87
Oats	1.32	1.44	1.46	1.40	1.28	1.14	1.34	1.20	1.39	1.67	1.33	1.19	1.01	1.01	1.54
Rye	1.03	0.73	0.62	0.59	0.56	0.70	0.77	0.64	0.50	0.40	0.44	0.36	0.29	0.24	0.29
Millet and sorghums	1.82	0.98	2.51	3.28	3.10	2.37	3.86	3.93	3.80	6.21	11.18	9.63	7.96	7.34	7.12
Rice (milled equivalent) [2]	5.43	5.49	4.82	4.77	5.50	5.69	5.49	6.33	6.56	6.87	5.94	5.60	5.26	5.61	6.05
Sugar (raw equivalent) [3]	13.51	14.61	14.42	13.34	16.13	17.22	15.51	15.19	15.14	16.59	16.10	17.52	18.11	16.79	20.01
Potatoes	2.33	1.87	2.58	2.47	2.38	2.34	2.67	2.42	2.41	2.93	2.69	2.63	2.62	3.16	3.11
Pulses (dry)	1.04	0.84	0.84	1.06	1.04	0.93	1.19	1.34	1.27	1.43	1.37	1.30	1.44	1.50	1.52
Apples	0.87	1.14	0.84	1.28	1.24	1.38	1.51	1.21	1.41	1.70	1.55	1.59	1.73	1.74	1.68
Bananas	3.05	3.36	3.53	3.68	3.88	3.98	3.88	4.03	4.23	4.54	5.17	5.38	5.77	5.94	5.96
Citrus fruit [4]	2.37	2.67	2.77	3.09	3.34	3.23	3.58	3.27	4.14	4.20	4.21	4.36	4.26	4.48	4.89
Grapes (fresh)	0.36	0.31	0.39	0.38	0.43	0.44	0.50	0.45	0.55	0.60	0.60	0.63	0.60	0.65	0.67
Dates	0.32	0.29	0.30	0.34	0.32	0.24	0.30	0.40	0.35	0.33	0.36	0.33	0.32	0.36	0.42
Vegetables oils and oilseeds (oil equivalent) [5]	5.06	5.20	4.90	5.24	5.57	5.52	5.83	6.06	6.43	6.52	6.43	6.19	6.66	6.76	8.02
Oilseed cake and meal	3.53	3.23	3.88	4.64	4.45	4.96	6.11	6.61	7.33	8.04	8.36	8.51	8.86	9.25	10.94
Cattle [6]	2.12	2.97	3.15	2.63	2.82	3.68	3.65	3.77	3.48	3.84	3.49	3.70	4.20	4.39	4.51
Sheep, lambs and goats	2.26	1.86	1.92	2.54	2.80	3.46	3.99	4.45	4.15	4.03	3.95	3.91	4.82	4.20	4.49
Pigs [6]	0.52	0.52	0.49	0.99	1.23	1.19	1.02	0.70	0.85	0.92	0.65	0.95	1.24	1.62	2.28
Meat [7]	1.38	1.50	1.58	1.71	1.74	1.85	2.21	2.57	2.58	2.54	2.58	2.72	2.86	3.17	3.32
Milk (condensed, evaporated and powdered)	0.82	0.81	0.80	0.91	0.90	0.97	1.03	1.21	1.39	1.37	1.42	1.58	1.79	1.83	2.15
Eggs (in the shell)	0.35	0.37	0.39	0.43	0.41	0.39	0.34	0.29	0.24	0.20	0.18	0.18	0.21	0.25	0.28
Coffee (green)	2.33	2.22	2.19	2.55	2.61	2.67	2.82	3.02	2.79	2.70	3.00	3.12	3.30	3.30	3.14
Cocoa beans	0.75	0.78	0.64	0.75	0.90	1.00	1.03	1.04	1.03	1.30	1.11	1.07	1.05	1.01	1.07
Tea	0.50	0.48	0.52	0.49	0.49	0.52	0.54	0.55	0.55	0.57	0.54	0.59	0.60	0.56	0.62
Wine	2.48	2.81	2.78	2.42	2.69	2.66	2.83	2.37	2.56	2.33	2.53	2.08	2.29	2.47	3.78
Pepper and pimento	0.12	0.10	0.10	0.12	0.10	0.12	0.13	0.14	0.12	0.12	0.13	0.17	0.18	0.16	0.15
Tobacco (unmanufactured)	0.64	0.67	0.66	0.64	0.68	0.77	0.77	0.76	0.87	0.84	0.80	0.87	0.85	0.87	0.86
Wool (actual weight)	1.18	1.20	1.15	1.37	1.31	1.42	1.40	1.38	1.29	1.39	1.40	1.29	1.45	1.44	1.46
Cotton (lint)	2.82	3.06	2.65	2.79	3.50	3.28	3.00	3.37	3.47	3.22	3.36	3.26	3.28	3.07	3.18
Jute and kenaf	0.88	0.81	0.95	0.89	0.83	0.76	0.99	0.90	1.00	1.13	1.20	1.07	0.99	0.84	0.82
Rubber (natural) [8]	1.94	1.96	1.97	2.28	2.01	2.22	2.28	2.24	2.24	2.31	2.22	2.26	2.65	2.77	2.82
Fishery products [9]															
Fresh, chilled or frozen fish	0.83	0.87	0.96	1.00	1.14	1.15	1.34	1.48	1.71	1.72	1.80	1.79	1.82	1.83	1.97
Dried, salted or smoked fish	0.67	0.63	0.61	0.58	0.56	0.55	0.55	0.54	0.50	0.50	0.50	0.50	0.49	0.50	0.51
Crustacea and molluscs, fresh, frozen, dried, salted, etc.	0.18	0.17	0.18	0.21	0.23	0.25	0.27	0.27	0.30	0.30	0.30	0.32	0.34	0.37	0.42
Fish products and preparations, whether or not in airtight containers	0.43	0.43	0.47	0.51	0.50	0.52	0.54	0.51	0.58	0.52	0.57	0.56	0.61	0.58	0.62
Crustacean and mollusc products and preparations, whether or not in airtight containers	0.04	0.04	0.04	0.05	0.04	0.04	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.07
Oils and fats, crude or refined, of aquatic animal origin	0.33	0.44	0.48	0.54	0.59	0.62	0.67	0.74	0.63	0.72	0.68	0.81	0.84	0.71	0.64
Meals, solubles and similar animal feedstuffs of aquatic animal origin	0.53	0.57	0.67	0.83	1.03	1.36	1.72	1.78	2.44	2.47	2.48	3.05	3.58	3.04	2.98
Forest products [9]															
Pulpwood [10]	10.6	10.3	8.5	9.0	10.8	13.1	12.4	11.7	13.2	13.8	14.2	14.8	14.1	15.8	18.9
Coniferous logs [10]	1.8	2.1	2.7	3.3	4.2	5.9	6.4	8.7	9.9	11.6	13.8	17.2	21.6	21.0	24.3
Broadleaved logs [10]	7.7	8.4	9.4	11.8	13.3	14.0	14.2	17.4	19.3	20.7	21.9	24.2	28.9	34.2	36.4
Sawn softwood [10]	28.1	30.4	29.7	32.3	36.3	36.3	38.2	41.4	44.6	44.0	42.6	42.8	47.5	47.4	48.3
Sawn hardwood [10]	3.4	3.5	3.6	3.9	4.5	4.3	4.3	4.6	5.4	5.8	5.9	5.9	6.4	7.1	7.1
Plywood and veneers [10]	1.1	1.3	1.4	1.9	1.8	1.9	2.1	2.4	3.0	3.3	3.6	3.8	4.7	5.2	5.2
Fibreboard	0.6	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.1	1.1	1.1	1.2	1.3	1.4	1.3
Mechanical wood pulp	1.3	1.3	1.1	1.2	1.3	1.3	1.2	1.3	1.4	1.4	1.4	1.2	1.3	1.3	1.3
Chemical wood pulp	6.5	6.6	6.6	7.3	8.4	8.5	9.0	10.1	11.0	11.1	12.1	12.3	13.6	14.9	15.4
Newsprint	7.0	6.9	6.8	7.0	7.5	7.7	7.5	7.8	8.5	9.0	9.7	9.4	9.7	10.6	10.6
Other paper and paperboard	3.2	3.5	3.5	4.0	4.5	5.0	5.2	5.9	6.8	7.4	8.4	8.7	10.1	11.9	12.8

[1] Including exports to the U.S.S.R., eastern Europe and mainland China, but excluding exports from these countries. – [2] Including paddy converted at 65 percent. – [3] Including refined sugar converted at 108.7 percent. – [4] Oranges, mandarines and lemons. – [5] Excluding reexports of copra from Malaysia, but including unrecorded shipments of copra from Indonesia and the Philippines to Malaysia. – [6] Million head. – [7] Beef and veal, mutton and lamb, pork, poultry meat. – [8] Excluding imports into Malaysia for reexports and exports from Hong Kong, but including unrecorded shipments from Indonesia to Malaysia. – [9] Excluding mainland China only. – [10] Million cubic metres.

ANNEX TABLE 1C. – WORLD:[1] AVERAGE EXPORT UNIT VALUES OF SELECTED AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	U.S. dollars per metric ton														
Agricultural products [2]															
Wheat	62.9	63.5	62.5	62.2	61.7	63.3	66.2	64.6	66.1	61.0	63.2	66.2	63.6	63.4	60.1
Wheat flour	89.7	88.7	84.8	79.0	76.9	78.5	81.8	81.5	84.3	84.9	87.1	84.5	82.4	82.9	83.7
Barley	55.1	51.1	51.3	52.7	52.8	47.2	57.6	55.8	56.6	62.5	69.6	67.3	63.9	58.6	51.7
Maize	60.0	55.1	50.6	50.2	50.1	49.2	47.8	52.9	54.7	57.2	57.5	56.0	51.3	55.1	60.6
Rice (milled)	117.4	117.2	122.4	112.9	103.3	109.5	122.0	121.7	124.8	127.5	140.2	163.6	180.6	165.4	136.4
Sugar (raw)	95.4	114.1	99.9	96.0	93.1	95.4	97.3	138.4	138.9	105.4	104.6	103.1	102.9	115.0	120.8
Apples	128.4	136.7	154.3	111.8	138.0	125.7	137.1	146.0	134.9	142.9	158.7	157.3	154.9	160.9	160.5
Bananas	105.7	105.6	98.1	92.3	86.4	90.4	90.2	87.0	89.8	91.9	89.2	92.5	87.5	87.5	93.6
Oranges and tangerines	124.1	133.7	127.0	105.6	110.5	121.1	121.4	137.4	120.7	119.8	129.8	126.3	123.3	130.1	124.2
Raisins	275.4	279.8	326.4	317.1	272.0	282.3	263.3	272.4	335.0	341.4	330.2	323.8	318.9	318.6	313.0
Dates	42.1	56.4	51.6	50.4	62.5	63.7	99.5	83.8	89.8	84.4	90.7	89.4	102.6	88.4	89.9
Cottonseed	84.0	80.8	68.4	67.5	77.8	77.5	68.6	62.1	63.1	68.2	76.1	80.1	72.2	62.7	67.9
Copra	143.5	139.3	163.7	201.9	174.7	141.9	142.2	157.4	165.4	188.4	163.9	160.2	190.4	163.0	184.7
Palm kernels	123.7	121.1	125.7	158.4	157.9	126.8	120.3	136.5	139.0	166.9	148.9	128.1	157.4	141.2	149.6
Soybeans	95.8	91.2	86.8	84.7	83.3	94.4	92.4	99.1	99.4	104.8	113.5	107.2	101.1	97.0	102.5
Groundnuts (shelled)	195.2	204.1	171.8	164.6	182.1	179.5	170.5	168.7	175.6	155.0	187.5	173.4	158.1	183.9	209.3
Olive oil	763.6	668.6	589.3	507.0	511.9	532.9	564.8	803.0	553.6	630.6	638.7	678.6	698.1	642.7	688.8
Cottonseed oil	333.8	337.9	358.0	292.5	244.5	304.6	303.9	266.8	251.9	292.9	295.3	289.5	269.3	258.9	290.1
Coconut oil	235.2	243.5	273.6	342.6	292.5	233.0	221.0	256.4	279.9	305.7	260.0	261.3	315.1	273.5	302.3
Palm oil	219.2	220.8	202.6	206.5	194.1	206.4	194.4	188.6	201.7	237.7	203.8	193.1	145.7	143.5	213.0
Palm kernel oil	236.1	242.1	252.4	316.8	296.2	230.7	209.4	230.9	232.4	287.6	250.4	226.6	317.2	274.4	293.7
Soybean oil	343.4	338.6	303.6	254.1	233.0	284.5	244.8	239.4	239.1	293.8	299.2	271.1	221.0	229.3	271.7
Groundnut oil	399.5	397.2	361.2	325.8	343.1	344.3	299.9	307.2	322.6	336.5	311.4	318.3	263.8	309.8	331.2
Cattle [3]	125.2	126.7	135.9	145.2	138.2	130.7	120.5	132.1	150.2	151.9	132.7	137.7	132.5	142.7	153.2
Pigs [3]	56.8	43.3	51.2	49.1	47.7	47.1	45.9	53.6	56.5	55.8	67.8	62.2	64.2	70.5	74.0
Beef and veal	414.7	437.1	500.9	573.7	595.3	559.6	529.9	557.0	678.6	771.5	771.8	765.0	791.2	851.0	886.3
Mutton and lamb	453.5	460.3	429.1	377.9	401.2	378.1	372.2	414.3	464.2	519.0	492.0	462.7	428.7	461.9	515.5
Poultry meat	825.4	781.6	767.4	682.2	669.2	630.3	650.9	662.4	668.1	693.6	710.5	634.7	644.9	681.6	642.1
Bacon, ham, salted pork	726.3	684.1	712.5	675.0	686.0	661.6	667.0	717.5	782.0	759.7	868.0	818.6	720.2	791.0	831.5
Canned meat	873.6	820.8	848.1	883.5	901.8	937.1	907.4	878.0	924.3	951.2	1 020.2	1 019.6	1 016.4	1 043.3	1 101.0
Milk, condensed and evaporated	317.6	330.3	311.2	307.9	308.8	307.4	299.8	306.2	328.1	336.3	333.7	314.4	299.5	305.5	249.2
Milk, powdered	374.8	429.0	375.6	355.1	401.8	363.5	336.5	298.8	305.2	385.9	378.3	382.2	300.7	339.2	338.0
Butter	923.5	783.9	639.6	904.8	829.9	714.3	762.5	826.4	896.0	905.7	818.3	798.1	726.0	720.7	753.8
Cheese	736.9	708.5	639.0	739.3	721.8	719.3	701.7	709.6	763.9	841.3	867.0	878.8	876.6	929.3	997.6
Potatoes	58.8	51.8	59.4	57.3	56.1	52.3	72.7	62.6	57.0	68.0	75.2	71.2	58.5	70.4	83.2
Oilseed cake and meal	67.7	61.9	55.4	68.7	68.1	63.7	70.4	77.6	76.2	78.8	82.2	81.7	80.5	79.5	83.3
Coffee	1 051.0	1 025.2	922.8	749.1	723.4	684.2	655.6	646.9	839.8	811.1	774.4	699.6	725.4	727.9	895.7
Cocoa	580.8	562.9	844.0	738.8	593.4	474.3	454.0	486.1	502.4	378.7	402.0	544.4	596.1	779.2	771.2
Tea	1 215.5	1 191.0	1 170.6	1 144.5	1 168.0	1 144.6	1 102.8	1 110.9	1 089.2	1 050.9	1 004.2	990.7	915.2	829.0	888.2
Wine	155.1	170.3	207.2	176.2	177.6	182.2	173.6	202.3	203.7	212.0	211.8	254.5	248.6	258.8	234.2
Tobacco (unmanufactured)	1 227.6	1 334.5	1 280.8	1 290.2	1 280.1	1 211.7	1 204.0	1 310.1	1 235.5	1 244.7	1 356.7	1 310.3	1 309.8	1 308.6	1 289.3
Linseed	145.4	116.7	125.1	131.6	132.4	127.9	134.6	124.6	121.2	119.7	114.1	120.0	127.0	121.2	111.4
Linseed oil	313.6	245.6	250.7	212.5	246.8	254.1	229.7	200.7	208.2	201.4	189.0	174.2	209.7	214.8	206.8
Castor beans	134.7	182.0	117.4	110.4	134.1	123.9	106.9	111.1	114.3	106.0	106.9	119.9	127.0	126.6	111.5
Castor oil	288.8	279.5	273.0	238.2	282.2	280.1	263.4	249.4	240.9	205.1	238.7	311.6	328.9	252.0	263.8
Cotton	731.9	732.8	673.2	587.0	624.1	641.2	609.6	609.3	603.0	617.1	564.7	558.2	589.3	586.4	607.8
Jute and kenaf	183.8	208.5	193.0	174.8	220.2	291.0	194.7	199.5	161.1	215.6	223.9	225.7	202.6	224.8	225.6
Sisal	158.3	141.8	146.9	174.5	214.8	193.4	197.1	293.2	285.8	190.8	172.5	140.6	118.8	137.5	126.7
Wool (greasy)	1 378.0	1 598.4	1 132.8	1 083.6	1 162.4	1 143.8	1 138.2	1 324.8	1 445.7	1 175.8	1 223.5	1 120.1	997.0	1 089.3	959.2
Rubber (natural)	627.5	596.5	516.0	659.4	743.0	548.1	524.8	503.5	462.4	445.8	436.6	358.9	316.0	425.5	383.0
Fishery products [1]															
Fresh, chilled or frozen fish	274.9	284.5	293.1	302.4	287.1	301.2	315.1	296.7	289.2	328.9	352.8	323.7	346.0	391.5	421.9
Dried, salted or smoked fish	291.2	296.4	296.5	307.9	328.3	331.1	345.0	361.2	390.9	426.9	455.4	473.8	447.5	464.9	506.4
Crustacea and molluscs, fresh, frozen, dried, salted, etc.	536.7	647.0	670.3	667.4	634.3	684.2	758.1	845.8	796.0	891.6	989.5	1 067.6	1 130.0	1 204.3	1 175.9
Fish products and preparations, whether or not in airtight containers	621.1	606.5	646.3	632.3	624.3	600.8	695.1	648.6	639.3	703.0	681.9	726.6	701.3	737.9	758.4
Crustacean and mollusc products and preparations, whether or not in airtight containers	1 071.1	1 075.5	1 105.6	1 066.6	1 099.5	1 150.5	1 146.4	1 210.8	1 283.1	1 319.2	1 469.2	1 431.3	1 484.1	1 578.4	1 684.9
Oils and fats, crude or refined, of aquatic animal origin	238.3	241.6	207.3	191.9	180.1	172.6	133.3	137.3	182.7	194.0	182.2	128.5	92.0	122.3	197.8
Meals, solubles and similar animal feedstuffs of aquatic origin	145.7	136.9	133.3	134.0	92.6	86.8	103.8	107.9	109.9	125.3	144.6	117.8	107.6	129.0	166.4

ANNEX TABLE 1C. – WORLD:[1] AVERAGE EXPORT UNIT VALUES OF SELECTED AGRICULTURAL, FISHERY AND FOREST PRODUCTS (*concluded*)

Forest products [1]	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	U.S. dollars per metric ton														
Fuelwood [4]	8.8	8.8	9.2	8.0	8.1	9.4	9.7	9.9	9.7	10.0	10.2	9.6	8.8	9.1	9.1
Charcoal	21.6	22.7	23.1	21.8	22.8	23.3	22.1	22.0	25.0	27.8	26.3	30.0	25.7	20.2	20.2
Coniferous logs [4]	15.7	16.4	17.0	17.5	17.4	17.8	18.1	14.4	15.2	16.7	17.3	18.2	20.1	22.8	23.0
Broadleaved logs [4]	19.6	18.4	18.6	19.0	22.6	22.0	22.6	23.5	22.9	23.3	24.1	24.2	24.2	26.3	25.5
Pulpwood [4]	12.1	12.3	11.6	10.8	10.8	11.9	11.3	10.7	11.0	11.2	10.7	10.8	10.8	10.3	11.0
Pitprops [4]	14.3	14.7	14.0	12.5	11.9	13.0	13.0	13.0	15.1	16.4	17.3	17.6	17.1	17.4	17.4
Poles, piling. posts [4]	32.3	34.2	28.0	25.0	23.9	22.9	24.1	24.8	27.9	29.3	32.1	26.2	26.9	30.7	30.7
Sawn softwood [4]	39.4	39.0	36.8	36.6	36.7	35.9	35.0	35.0	36.6	38.1	38.4	37.0	39.6	44.0	44.4
Sawn hardwood [4]	62.2	60.2	58.7	58.5	59.4	59.0	59.2	63.8	61.3	58.8	60.2	59.0	59.1	61.0	60.7
Sleepers [4]	37.6	39.2	37.1	37.6	36.9	35.1	36.1	39.7	42.5	40.7	40.1	42.1	42.3	37.8	37.8
Veneer sheets [4]	260.6	271.8	263.5	262.4	259.0	253.3	262.2	247.9	237.2	262.0	253.5	260.0	255.6	270.6	273.3
Plywood [4]	160.5	155.6	152.0	156.1	149.5	145.1	150.1	152.9	142.6	139.4	143.4	141.0	145.5	155.2	156.7
Particle board	135.1	143.3	131.1	116.5	108.8	113.9	110.1	108.5	109.2	107.2	107.2	105.3	101.0	106.5	108.7
Fibreboard	101.1	100.3	93.6	91.3	91.1	87.7	88.7	91.8	97.0	104.0	106.1	101.4	99.9	105.0	107.1
Mechanical wood pulp	76.6	77.1	70.5	67.4	66.6	66.1	65.6	64.6	64.9	68.9	68.4	67.5	68.7	66.4	69.0
Chemical wood pulp	147.5	149.6	140.5	134.2	133.4	132.3	125.4	125.0	134.1	136.8	131.6	131.3	127.5	132.8	146.1
Newsprint	135.9	141.1	138.4	140.0	134.8	129.1	127.1	125.8	126.2	124.7	126.3	130.2	132.5	135.6	134.2
Printing and writing paper	261.3	267.2	251.4	236.0	236.8	235.9	229.3	222.9	226.1	226.4	234.9	236.5	237.3	232.9	244.5

[1] Excluding mainland China and other centrally planned countries in Asia. – [2] Excluding centrally planned countries. – [3] U.S. dollars per thousand head. – [4] U.S. dollars per cubic metre.

ANNEX TABLE 1D. — ANNUAL CHANGES IN CONSUMER PRICES

	All items				Food			
	1960 to 1965	1965 to 1968	1968 to 1969	1969 to 1970	1960 to 1965	1965 to 1968	1968 to 1969	1969 to 1970
	Percent per year							
Western Europe								
Austria	3.9	3.0	3.4	4.1	4.4	2.1	3.4	4.7
Belgium	2.5	3.2	3.8	3.9	2.9	3.0	4.6	3.5
Denmark	5.5	7.4	4.4	5.6	4.2	7.8	5.2	6.4
Finland	5.3	6.2	2.9	2.8	5.9	[14].2	3.1	1.5
France	3.8	3.3	6.4	5.3	4.3	2.5	6.3	6.0
Germany, Fed. Rep. of	2.8	2.3	2.7	3.9	2.6	0.7	2.7	2.9
Greece	1.6	2.4	2.7	3.5	2.5	2.1	3.3	3.4
Iceland	11.0	9.9	22.0	13.1	15.2	[17].9	28.7	16.5
Ireland	4.2	3.6	7.3	8.2	3.9	2.7	6.0	7.6
Italy	4.9	2.3	2.6	5.0	4.6	1.3	2.8	4.3
Netherlands	3.5	4.3	7.5	4.4	4.0	3.4	6.5	4.3
Norway	4.1	3.7	3.3	10.2	4.5	3.3	4.0	12.9
Portugal	2.6	5.5	8.7	6.6	2.8	4.4	8.1	4.9
Spain	7.0	5.8	2.1	5.4	7.7	4.3	2.0	3.6
Sweden	3.6	4.2	2.7	7.1	5.3	3.6	3.4	8.5
Switzerland	3.2	3.7	2.5	3.6	2.9	[13].4	1.7	2.6
United Kingdom	3.6	3.7	5.5	6.4	3.6	3.4	6.3	7.0
Yugoslavia	13.6	11.3	10.1	13.2	17.4	8.3	8.0	16.7
North America								
Canada	1.6	3.8	4.5	3.4	2.2	3.6	4.1	2.3
United States	1.3	3.3	5.4	5.9	1.4	3.1	5.2	5.5
Oceania								
Australia	1.8	3.0	2.9	3.8	2.0	2.8	1.3	3.6
New Zealand	2.7	4.4	4.9	6.6	2.4	4.0	4.7	6.6
Other developed countries								
Israel	7.1	3.9	2.5	6.1	5.6	3.3	6.2	—
Japan	6.0	4.8	5.2	7.7	7.2	5.0	6.0	9.0
South Africa	2.1	2.9	2.9	[2]4.6	2.6	2.9	1.7	[2]1.9
Latin America								
Argentina	23.0	26.0	7.6	13.6	23.0	23.0	6.2	16.4
Bolivia	5.1	7.9	2.2	[3]3.8	2.1	10.8	2.1	[3]4.9
Brazil	60.0	33.0	23.2	[4]19.4	60.0	30.0	24.8	[4]19.8
Chile	27.0	22.0	30.6	32.5	30.0	21.0	30.7	35.4
Colombia	12.4	11.1	10.1	[5]7.2	13.4	10.2	10.5	[5]6.0
Costa Rica	2.3	1.8	2.7	4.7	2.2	2.3	4.5	7.6
Dominican Republic	2.7	0.5	1.0	1.2	2.5	0.7	—1.1	4.1
Ecuador	4.0	[6]4.0	6.3	[7]4.3	4.9	[6]4.6	9.9	[7]2.5
El Salvador	0.2	0.9	—0.3	2.9	1.1	2.3	—0.5	4.9
Guatemala	0.1	1.0	2.2	[7]2.9	0.1	1.2	1.2	[7]4.7
Guyana	1.9	2.7	1.3	3.4	2.3	3.0	0.5	4.5
Haiti	3.7	2.1	1.3	[3]—1.1	4.1	2.2	2.4	[3]0.8
Honduras	2.7	2.2	2.7	2.0	3.2	1.3	—0.4	3.0
Jamaica	2.9	[1]2.5	6.2	[4]10.2	2.4	[1]2.7	6.5	[4]11.7
Mexico	1.9	3.2	2.9	5.1	1.6	3.5	2.9	5.8
Peru	9.4	[8]9.4	6.3	[5]5.0	10.5	[8]10.6	5.3	[5]2.9
Puerto Rico	2.2	3.3	3.2	[5]3.2	3.0	4.3	4.0	[5]3.5
Uruguay	[9]16.2	95.0	20.9	[3]16.0	[9]13.1	95.0	12.4	[3]11.7
Venezuela	[10]1.7	1.0	2.4	2.1	[10]1.7	0.1	2.9	1.2

ANNEX TABLE 1D. — ANNUAL CHANGES IN CONSUMER PRICES (*concluded*)

	All items				Food			
	1960 to 1965	1965 to 1968	1968 to 1969	1969 to 1970	1960 to 1965	1965 to 1968	1968 to 1969	1969 to 1970
	Percent per year							
Far East								
Ceylon	1.7	2.6	7.3	5.9	1.3	4.1	5.6	6.7
China (Taiwan)	2.4	4.4	5.0	3.6	1.6	6.1	4.8	2.7
India	6.1	8.9	...	[5]5.1	6.5	9.8	...	[5]5.3
Indonesia	...	...	6.1	[7]12.9	...	...	3.1	[7]10.7
Khmer Republic	4.3	1.6	6.3	10.2	2.7	1.4	10.5	14.4
Korea, Republic of	15.4	[6]10.8	12.4	[5]16.0	18.3	[6]9.1	16.1	[5]21.7
Laos	38.0	8.9	3.2	0.3	39.0	9.8	1.8	—7.0
Malaysia, West	0.5	1.9	—1.0	[3]1.3	0.6	1.9	—1.0	[3]0.1
Pakistan	2.6	4.7	3.2	5.4	3.8	4.5	3.1	7.8
Philippines	[11]4.8	3.9	3.1	[3]5.1	[11]6.8	6.5	1.3	[3]8.9
Thailand	1.5	3.3	2.1	0.8	2.0	5.7	4.0	0.2
Near East								
Cyprus	0.3	[10]0.6	2.3	2.4	0.2	[11]1.1	4.1	1.4
Iran	2.0	0.7	3.1	2.1	3.1	0.2	2.5	1.2
Iraq	...	1.6	9.1	[5]4.1	...	1.6	6.9	[5]3.5
Jordan	...	...	7.8	[11]7.0	...	...	21.5	[11]6.8
Libya	...	5.3	8.6	[12]1.3	...	7.2	11.9	[12]11.9
Sudan, the	3.3	0.5	12.5	...	4.2	—0.1	11.7	...
Syria	[10]1.3	4.6	—0.9	1.6	[10]1.3	6.6	—	0.7
United Arab Republic	3.2	[4]4.8	3.4	[3]3.6	6.5	[4]4.6	5.6	[3]6.9
Africa								
Congo, Dem. Rep. of	[13]15.6	34.0	13.6	[4]5.2	[13]19.0	33.0	9.5	[4]7.4
Gabon	[10]4.4	2.7	2.7	...	[10]3.3	2.5	3.1	...
Ghana	11.8	2.2	8.8	[5]0.6	14.0	—0.2	12.3	[5]—0.6
Ivory Coast	2.6	3.9	4.4	8.8	2.8	3.2	7.3	12.4
Kenya	2.0	2.2	—0.3	2.3	1.9	2.9	—1.1	2.5
Liberia	...	3.7	10.3	0.7	...	1.5	11.9	1.2
Madagascar	...	1.6	3.8	2.9	...	1.1	4.5	3.0
Mauritius	[10]1.0	3.7	2.3	1.5	[10]0.6	4.3	0.6	1.3
Morocco	4.0	—0.4	2.9	[5]1.2	4.6	—1.3	3.2	[5]1.0
Mozambique	[14]1.9	3.7	2.4	[2]2.3	[14]0.7	4.3	5.1	[2]0.6
Niger	...	2.6	10.4	[4]—0.1	...	3.1	16.1	[4]—4.9
Nigeria	3.2	1.8	9.9	[7]13.2	2.0	0.6	21.2	[7]23.4
Sierra Leone	[14]3.9	3.5	3.3	[12]8.4	[14]0.6	2.0	4.6	[12]16.8
Tanzania	1.2	3.7	1.0	3.0	1.2	2.7	—2.0	3.6
Tunisia	[10]4.5	3.1	4.2	1.0	[10]4.8	3.0	5.3	1.5
Uganda	5.4	—1.4	...	...	7.3	—3.3	...	...
Zambia	2.4	8.6	2.4	...	2.4	8.8	1.6	...

[1] 1965 to 1967. — [2] January-May. — [3] January-September. — [4] January-August. — [5] January-November. — [6] 1966 to 1968. — [7] January-October. — [8] 1965 to 1966. — [9] 1960 to 1962. — [10] 1962 to 1965. — [11] January-July. — [12] January-June. — [13] 1963 to 1965. — [14] 1961 to 1965.

ANNEX TABLE 2A. – WESTERN EUROPE: BASIC DATA ON NATIONAL AGRICULTURE

	Period	Population in agriculture		Agricultural GDP			Share of agriculture in value of total trade		Arable land per person in agriculture	Fertilizer consumption per hectare of arable land
							Exports	Imports		
		Thousands	*Percent of total*	*Million dollars*	*Percent of total*	*Dollars per caput*	..... *Percent*		*Hectares per caput*	*Kilogrammes per hectare*
Austria	1950	[1] 1 516	22	401	18	265	[1] 25	[1] 45	1.22	47
	1960	[2] 1 155	16	650	12	563	20	22	[2] 1.49	128
	1965	1 045	14	723	9	692	15	21	1.61	208
	1968	1 004	14	859	9	855	13	16	1.67	213
Belgium	1950	1 116	10	[3] 599	8	536	[4] 15	[4] 43	0.93	293
	1960	[2] 644	7	710	7	1 102	9	25	1.10	360
	1965	570	6	905	6	1 587	11	22	1.65	474
	1968	553	6	978	5	1 769	11	19	1.60	547
Denmark	1950	1 014	24	657	21	648	[1] 75	[1] 29	2.66	102
	1960	828	18	822	14	992	63	25	3.36	151
	1965	655	14	1 088	11	1 661	55	22	4.18	180
	1968	627	13	1 078	9	1 719	48	18	4.32	204
Finland	1950	1 366	34	540	26	395	...	...	1.82	44
	1960	1 408	32	880	20	625	55	17	1.89	93
	1965	1 310	28	1 302	18	994	44	16	2.08	126
	1968	1 214	26	1 087	15	895	36	16	2.27	156
France	1950	...	...	4 316	15	...	[1] 21	[1] 56	...	50
	1960	[5] 8 362	18	6 000	10	718	18	40	2.57	102
	1965	7 657	16	6 248	8	816	20	30	2.68	151
	1968	7 124	14	7 685	7	1 079	20	23	2.71	210
Germany, Fed. Rep. of	1950	7 007	15	2 329	10	332	[1] 5	[1] 67	1.22	167
	1960	[2] 4 500	8	4 237	6	942	4	39	1.90	266
	1965	4 547	8	4 920	5	1 082	4	33	1.85	343
	1968	4 346	7	4 641	4	1 068	4	28	1.89	339
Greece	1950	[6] 3 929	52	611	31	155	[7] 80	[7] 37	0.88	15
	1960	[2] 4 482	54	771	25	172	81	19	0.83	38
	1965	4 590	54	1 270	25	277	78	23	0.84	65
	1968	4 622	53	1 331	21	288	65	19	0.79	87
Ireland	1950	[8] 1 463	49	271	29	185	[1] 84	[1] 35	0.89	61
	1960	[2] 973	35	390	25	401	67	25	1.41	123
	1965	913	32	493	21	539	63	25	1.42	168
	1968	886	30	497	20	561	57	23	1.30	308
Italy	1950	[8] 20 026	44	[15] 370	23	...	[1] 25	[1] 52	0.83	29
	1960	[2] 13 888	28	4 478	15	322	18	39	1.14	51
	1965	12 380	24	6 546	13	529	14	37	1.24	70
	1968	11 174	21	7 359	11	659	9	32	1.36	76
Malta	1950	[8] 39	13	...	...	...	...	...	[8] 0.44	10
	1960	55	17	9	7	155	24	42	0.35	29
	1965	30	9	9	7	307	24	37	0.53	20
	1968	29	9	11	7	379	22	32	0.55	19
Netherlands	1950	1 405	14	613	14	436	[1] 41	[1] 37	0.75	407
	1960	1 171	10	1 120	11	956	33	26	0.89	456
	1965	1 030	8	1 375	8	1 335	30	23	0.95	575
	1968	971	8	1 573	7	1 620	29	21	0.94	622
Norway	1950	623	19	296	15	475	[1] 46	[1] 23	1.30	131
	1960	688	19	453	11	658	33	17	1.23	178
	1965	645	17	575	9	892	28	15	1.32	200
	1968	613	16	557	7	974	21	14	1.38	215
Portugal	1950	3 491	42	426	33	122	[1] 48	[1] 35	...	...
	1960	3 743	42	585	25	156	38	28	1.10	35
	1965	3 587	39	720	21	201	34	28	1.22	38
	1968	3 578	38	862	19	241	34	25	1.22	41
Spain	1950	13 250	48	...	...	...	[1] 52	[1] 36	1.47	11
	1960	12 423	41	2 307	24	186	54	29	1.89	32
	1965	11 060	35	3 596	18	325	50	25	1.86	38
	1968	11 583	36	3 825	16	330	39	24	1.75	57

ANNEX TABLE 2A. – WESTERN EUROPE: BASIC DATA ON NATIONAL AGRICULTURE (*concluded*)

	Period	Population in agriculture		Agricultural GDP			Share of agriculture in value of total trade		Arable land per person in agriculture	Fertilizer consumption per hectare of arable land
							Exports	Imports		
		Thousands	*Percent of total*	*Million dollars*	*Percent of total*	*Dollars per caput*	..... *Percent*		*Hectares per caput*	*Kilogrammes per hectare*
Sweden	1950	1 649	24	641	12	389	[1]47	[1]25	2.28	61
	1960	1 050	14	1 047	9	997	29	18	3.43	81
	1965	1 000	13	1 265	7	1 265	23	16	3.60	117
	1968	943	12	1 380	[9]6	1 463	19	15	3.21	151
Switzerland	1950	768	16	...	...	...	...	...	0.64	112
	1960	621	11	...	...	...	6	26	0.71	231
	1965	575	10	...	...	...	7	22	0.70	329
	1968	537	9	...	...	...	7	18	0.75	329
United Kingdom	1950	[1]2 520	5	1 905	6	756	[1]9	[1]69	2.95	112
	1960	[2]2 096	4	2 527	4	1 205	10	53	3.49	183
	1965	2 024	4	2 591	3	1 280	8	45	3.68	208
	1968	2 072	4	2 696	3	1 301	8	36	3.56	242
Yugoslavia	1950	[1]12 039	73	[7,10]751	24	62	[1]56	[1]49	0.65	2
	1960	[2]9 307	50	[2,10]1 601	26	172	47	22	0.92	33
	1965	9 145	47	[10]2 485	28	272	34	28	0.91	55
	1968	8 898	44	[10]1 955	24	220	29	16	0.93	75

[1] 1951. – [2] 1961. – [3] 1953. – [4] 1951 Belgium-Luxembourg. – [5] 1962. – [6] 1949. – [7] 1952. – [8] 1948. – [9] 1967. – [10] Net material product.

ANNEX TABLE 2B. – WESTERN EUROPE: VOLUME OF PRODUCTION OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat	31.99	40.50	39.09	42.67	39.60	37.64	47.88	41.56	46.84	48.90	44.61	52.17	51.83	50.18	47.57
Barley	19.04	17.51	17.73	20.35	22.15	22.54	25.92	28.50	29.53	30.91	32.57	37.95	37.91	39.55	35.84
Oats	15.98	13.23	12.88	12.57	13.29	12.96	12.63	12.62	11.97	11.86	11.89	13.40	13.10	12.62	11.98
Rye	7.14	7.21	6.99	7.18	7.04	5.41	6.03	5.85	6.34	5.40	4.87	5.55	5.59	5.12	4.73
Maize	10.22	12.27	11.15	14.39	14.89	13.19	12.45	15.21	15.44	14.90	18.30	17.89	19.32	21.79	23.26
Sugar (centrifugal)	6.49	7.06	8.18	7.31	9.92	7.80	7.34	8.56	10.21	9.08	9.47	10.12	10.36	11.03	10.70
Potatoes	84.47	79.16	72.51	72.82	79.85	73.06	74.02	80.64	68.48	63.17	65.04	69.00	66.42	59.87	63.62
Apples	10.06	4.19	13.47	7.12	13.53	7.87	11.93	10.05	10.51	10.82	9.89	12.17	10.65	11.66	11.15
Citrus fruit	1.84	2.76	2.91	3.28	3.26	4.06	3.25	4.25	4.43	4.55	5.15	4.92	5.15	5.89	4.69
Olive oil	0.88	1.02	0.79	1.06	1.09	1.23	0.80	1.62	0.65	1.10	1.07	1.18	1.15	1.16	1.17
Rapeseed	0.22	0.49	0.46	0.45	0.27	0.38	0.53	0.41	0.65	0.77	0.61	0.94	1.02	0.97	1.06
Total vegetable oils and oilseeds (oil equivalent) [1]	1.08	1.32	1.08	1.36	1.34	1.55	1.20	2.00	1.12	1.60	1.53	1.74	1.77	1.80	1.84
Wine	15.59	11.74	16.03	16.67	16.64	14.22	19.93	16.70	19.74	19.44	18.34	18.83	18.63	17.66	20.15
Tobacco	0.31	0.37	0.31	0.32	0.27	0.21	0.26	0.34	0.38	0.37	0.33	0.37	0.32	0.29	0.31
Cotton (lint)	0.11	0.11	0.11	0.14	0.14	0.20	0.21	0.20	0.15	0.16	0.18	0.17	0.18	0.18	0.17
Milk (total)	92.23	95.49	96.14	96.49	102.04	104.52	105.89	105.36	105.50	108.94	111.30	113.83	116.72	116.62	115.82
Meat [2]	11.81	12.18	12.41	13.00	13.72	14.58	15.33	15.61	15.81	16.35	16.96	17.75	18.46	18.52	19.22
Eggs	2.84	2.98	3.08	3.24	3.31	3.44	3.55	3.70	3.90	3.82	3.96	4.05	4.24	4.47	4.73
FISHERY PRODUCTS [3]	8.01	7.59	7.45	7.84	7.72	7.96	8.24	8.50	9.15	10.24	10.88	11.27	10.96	10.42	10.96
FOREST PRODUCTS															
Fuelwood [4]	79.7	87.0	84.7	81.9	77.5	76.3	72.9	70.5	66.8	62.5	59.1	55.9	53.4	50.6	48.0
Coniferous logs [4]	61.5	59.4	63.9	61.0	70.4	71.3	70.7	67.0	75.3	76.0	74.5	74.9	74.9	79.3	81.4
Broadleaved logs [4]	17.4	17.6	18.6	18.3	19.4	20.9	20.0	20.8	22.6	22.8	23.3	23.2	22.9	24.1	24.0
Other industrial roundwood [4]	70.3	73.9	70.0	69.3	75.8	81.5	83.2	77.7	82.2	82.6	84.0	90.3	83.4	89.5	94.0
Sawn softwood [4]	36.4	36.1	36.7	35.7	40.1	40.5	39.9	39.2	42.1	42.1	41.0	41.5	43.3	45.4	47.1
Sawn hardwood [4]	8.2	8.4	8.3	8.3	8.8	9.3	9.2	9.5	10.3	10.5	10.7	10.9	11.0	11.2	11.3
Plywood [4]	1.5	1.6	1.7	1.8	2.1	2.1	2.2	2.5	2.6	2.6	2.6	2.7	2.8	3.1	3.2
Fibreboard	1.2	1.3	1.3	1.4	1.6	1.7	1.7	1.8	2.0	2.0	1.9	1.9	2.1	2.2	2.3
Particle board	0.5	0.7	0.8	1.2	1.0	2.0	2.4	2.9	3.6	4.4	5.1	5.8	7.0	8.4	9.3
Mechanical wood pulp	4.4	4.5	4.5	4.8	5.4	5.6	5.6	5.8	6.2	6.4	6.7	6.5	7.1	7.6	8.0
Chemical wood pulp	7.7	8.2	8.0	8.7	9.8	10.6	10.8	11.8	13.1	13.8	13.8	14.6	15.1	16.3	17.0
Newsprint	3.2	3.3	3.3	3.5	4.0	4.1	4.1	4.1	4.4	4.7	4.9	4.9	5.0	5.4	5.8
Printing and writing paper	3.3	3.5	3.6	3.9	4.4	4.8	4.8	5.3	5.7	6.0	6.7	7.1	8.1	9.0	9.6
Other paper and paperboard	8.7	9.4	9.6	10.4	11.7	12.3	12.7	13.9	14.8	15.5	15.9	16.1	17.5	19.1	20.0

[1] Olive oil, soybeans, groundnuts, cottonseed, sesame seed, sunflowerseed, rapeseed, linseed, hempseed, castor beans. – [2] Beef and veal, mutton and lamb, pork, poultry meat. – [3] Nominal catch (liveweight). – [4] Million cubic metres.

ANNEX TABLE 2C. – WESTERN EUROPE: INDICES OF FOOD AND TOTAL AGRICULTURAL PRODUCTION

	Total agricultural production							Food production						
	1964	1965	1966	1967	1968	1969	1970 (Prelim-inary)	1964	1965	1966	1967	1968	1969	1970 (Prelim-inary)
	1952-56 average = 100													
Total production														
WESTERN EUROPE	129	130	133	141	145	145	145	129	130	134	142	146	146	147
European Economic Community	128	129	130	142	146	145	148	128	130	131	143	148	147	150
Belgium-Luxembourg	119	114	110	129	133	139	138	119	116	112	133	137	143	143
France	131	140	135	149	157	152	153	130	141	135	149	158	152	154
Germany, Fed. Rep. of	127	119	127	138	146	143	143	128	119	128	139	147	144	144
Italy	127	130	134	139	135	141	144	129	132	137	142	138	143	147
Netherlands	125	119	123	134	138	142	156	125	121	125	137	141	145	160
Other western Europe	130	130	137	141	143	144	142	130	130	137	141	143	145	143
Austria	138	123	133	145	148	154	147	139	123	134	146	148	154	148
Denmark	119	123	121	123	128	121	117	120	123	121	124	129	122	118
Finland	134	138	130	135	136	152	155	135	138	130	135	136	152	156
Greece	154	164	171	174	164	174	187	152	164	173	174	165	176	189
Iceland	135	142	147	148	138	142	143	143	151	156	158	146	151	152
Ireland	122	115	121	136	135	135	137	122	114	120	136	136	136	137
Malta	108	112	119	129	160	173	172	108	112	119	129	160	173	172
Norway	100	104	102	105	114	107	114	99	103	101	104	114	106	114
Portugal	120	122	110	123	123	117	120	120	122	109	123	123	117	120
Spain	131	130	145	143	156	158	156	131	130	145	144	157	160	158
Sweden	104	102	93	108	113	95	105	104	103	93	108	113	95	105
Switzerland	111	108	113	122	124	124	127	111	108	112	121	124	124	126
United Kingdom	138	142	145	148	145	146	154	138	143	146	149	146	147	155
Yugoslavia	154	146	182	179	173	193	168	156	147	186	183	178	200	174
Per caput production														
WESTERN EUROPE	118	118	120	126	128	127	127	118	118	120	127	129	129	128
European Economic Community	116	116	116	125	128	126	127	116	117	117	126	130	128	129
Belgium-Luxembourg	112	106	102	119	122	127	126	112	108	103	122	125	131	130
France	116	124	118	129	135	130	130	116	124	118	130	136	130	131
Germany, Fed. Rep. of	113	104	110	119	125	121	121	113	104	110	120	126	122	121
Italy	119	121	124	127	123	127	129	121	123	126	130	125	129	131
Netherlands	109	103	105	113	115	117	127	110	104	106	115	118	120	131
Other western Europe	121	120	125	127	128	129	126	121	119	125	127	129	129	127
Austria	133	117	127	138	140	145	138	133	118	127	138	140	145	138
Denmark	111	114	111	112	116	109	104	112	114	111	112	116	109	105
Finland	123	125	117	121	121	135	139	123	125	117	122	122	135	139
Greece	142	151	156	157	147	155	165	140	152	158	157	148	157	167
Iceland	110	114	115	115	106	108	108	117	122	123	122	112	115	115
Ireland	125	117	123	138	136	136	136	125	116	122	138	137	136	137
Malta	106	112	119	128	159	170	168	106	112	119	128	159	170	168
Norway	92	95	92	94	102	94	100	91	94	91	93	101	94	99
Portugal	113	114	101	112	111	105	106	113	114	101	112	112	105	106
Spain	121	119	131	127	138	138	135	120	118	131	128	139	140	137
Sweden	98	95	86	99	103	86	94	98	96	86	99	103	86	94
Switzerland	93	90	93	99	100	98	99	93	90	92	99	100	98	99
United Kingdom	129	133	135	136	133	134	140	130	133	135	137	134	135	141
Yugoslavia	138	129	159	155	148	164	142	139	130	162	158	153	170	146

ANNEX TABLE 2D. – WESTERN EUROPE: VOLUME OF IMPORTS OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat and wheat flour (wheat equivalent)	15.89	14.16	12.35	12.89	11.17	15.13	13.32	12.05	10.56	12.39	12.42	10.45	10.91	13.52	13.30
Barley	5.06	4.61	4.69	4.77	4.27	4.19	4.72	3.63	4.51	4.84	5.02	4.96	4.10	4.01	5.94
Maize	5.02	4.78	6.32	7.66	8.93	9.43	12.91	13.87	14.48	16.95	18.69	19.38	18.75	16.59	17.50
Oats	1.11	0.98	1.32	1.41	1.24	0.86	1.32	1.07	0.97	1.32	1.28	1.05	1.01	0.93	1.23
Rye	0.76	0.77	0.56	0.59	0.76	0.75	1.02	0.74	0.46	0.36	0.41	0.41	0.27	0.25	0.19
Millet and sorghums	1.65	0.68	1.88	2.72	2.51	1.77	2.88	2.03	2.18	2.74	3.20	2.43	1.49	0.84	1.33
Rice (milled equivalent) [1]	0.54	0.48	0.51	0.60	0.59	0.51	0.53	0.52	0.54	0.55	0.62	0.50	0.60	0.64	0.70
Sugar (raw equivalent) [2]	4.40	5.38	4.86	4.62	4.63	3.99	4.22	5.32	4.97	4.54	4.97	4.84	4.67	4.43	4.44
Potatoes	1.50	1.05	1.81	1.86	1.40	1.48	1.97	1.72	1.54	2.39	2.06	1.95	1.85	2.36	2.35
Pulses (dry)	0.56	0.47	0.50	0.62	0.61	0.45	0.61	0.68	0.66	1.03	1.00	0.81	0.97	1.16	0.92
Apples	0.66	0.94	0.68	0.99	0.95	1.11	1.23	0.96	1.13	1.36	1.28	1.24	1.30	1.30	1.28
Bananas	1.31	1.44	1.59	1.63	1.68	1.85	1.90	1.93	1.97	2.35	2.58	2.62	2.54	2.59	2.45
Citrus fruit [3]	1.96	2.22	2.36	2.55	2.76	2.71	2.98	2.71	3.30	3.21	3.31	3.19	3.14	3.46	3.58
Grapes (fresh)	0.28	0.24	0.33	0.30	0.32	0.37	0.43	0.37	0.44	0.50	0.48	0.49	0.48	0.51	0.51
Vegetable oils and oilseeds (oil equivalent) [4]	3.44	3.60	3.30	3.43	3.74	3.62	3.61	3.90	3.85	3.90	4.20	4.19	4.30	4.44	4.65
Oilseed cake and meal	3.14	2.95	3.69	4.42	4.44	4.60	5.67	5.91	6.17	7.00	7.99	7.48	7.44	8.04	8.98
Cattle [5]	1.33	1.60	1.41	1.32	1.49	1.83	1.49	2.02	1.94	2.03	2.03	2.56	2.99	3.33	3.24
Sheep, lambs and goats [5]	0.62	0.78	0.68	0.87	1.10	0.88	1.35	1.32	1.37	1.93	1.74	1.74	2.16	2.50	2.37
Pigs [5]	0.65	0.40	0.76	1.16	1.29	1.04	0.96	0.74	0.91	1.24	1.25	1.14	1.30	1.82	1.13
Meat (fresh, chilled and frozen) [6]	1.20	1.25	1.21	1.23	1.36	1.27	1.44	1.72	1.81	1.89	1.82	2.06	2.04	2.29	2.24
Butter	0.44	0.45	0.46	0.47	0.48	0.47	0.49	0.51	0.56	0.52	0.52	0.54	0.54	0.52	0.57
Cheese	0.30	0.31	0.33	0.34	0.34	0.36	0.39	0.42	0.43	0.46	0.47	0.48	0.50	0.50	0.55
Coffee (green)	0.74	0.75	0.79	0.87	0.93	0.99	1.04	1.12	1.19	1.18	1.24	1.28	1.38	1.47	1.50
Cocoa beans	0.39	0.45	0.39	0.43	0.47	0.52	0.56	0.56	0.54	0.59	0.60	0.55	0.54	0.55	0.56
Tea	0.27	0.31	0.30	0.27	0.28	0.29	0.29	0.30	0.29	0.30	0.28	0.32	0.34	0.28	0.32
Wine	2.13	2.53	2.64	2.18	2.45	2.39	2.55	1.95	2.10	1.92	2.16	1.62	1.67	1.97	2.49
Tobacco (unmanufactured)	0.40	0.41	0.41	0.40	0.47	0.48	0.52	0.52	0.54	0.53	0.52	0.56	0.54	0.57	0.60
Wool (actual weight)	0.85	0.89	0.77	0.89	0.83	0.86	0.88	0.86	0.81	0.80	0.80	0.73	0.80	1.83	0.79
Cotton (lint)	1.51	1.72	1.43	1.44	1.70	1.59	1.46	1.47	1.54	1.39	1.57	1.47	1.41	1.43	1.37
Sisal	0.28	0.30	0.32	0.34	0.36	0.36	0.39	0.40	0.37	0.38	0.39	0.34	0.37	0.35	0.35
Rubber (natural)	0.64	0.71	0.62	0.64	0.64	0.64	0.66	0.70	0.75	0.76	0.76	0.76	0.81	0.92	0.93
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh, chilled or frozen fish	370.8	381.6	417.8	461.0	552.8	598.9	648.8	727.2	747.3	820.9	792.5	816.9	911.4	855.6	873.0
Dried, salted or smoked fish	187.4	195.1	199.3	185.6	188.1	207.8	203.2	200.6	188.9	196.9	202.3	212.1	206.1	203.7	210.9
Crustacea and molluscs, fresh, frozen, dried, salted, etc.	88.0	73.7	84.8	102.0	187.8	104.4	117.3	109.0	136.8	138.1	132.0	143.0	151.0	161.0	176.0
Fish products and preparations, whether or not in airtight containers	189.5	174.8	204.7	234.9	221.9	219.0	261.8	254.3	269.4	272.8	256.6	253.3	273.1	255.4	259.5
Crustacean and mollusc products and preparations, whether or not in airtight containers	11.6	10.1	9.9	11.5	13.9	13.4	17.6	21.8	28.1	31.6	34.0	32.0	35.0	30.0	38.0
Oils and fats, crude or refined, of aquatic animal origin	436.0	491.4	471.8	499.7	580.2	570.7	596.0	640.9	593.6	623.9	568.3	749.6	782.3	679.5	601.0
Meals, solubles and similar animal feedstuffs of aquatic animal origin	437.9	457.8	494.2	581.4	760.4	960.2	1 165.6	1 195.5	1 496.2	1 564.7	1 469.5	1 723.3	2 045.0	2 102.8	2 002.0
	Million metric tons														
FOREST PRODUCTS															
Pulpwood [7]	5.50	4.90	4.27	4.81	6.61	8.63	7.57	7.01	8.81	9.51	8.99	9.14	9.78	10.95	14.50
Coniferous logs [7]	1.17	1.21	1.46	1.62	2.17	2.28	2.25	2.44	2.23	2.25	2.52	2.51	2.53	2.31	2.50
Broadleaved logs [7]	3.17	3.55	3.79	4.51	5.76	5.78	5.51	6.08	6.76	6.21	6.41	6.30	7.00	8.39	7.85
Pitprops [7]	2.98	3.01	2.50	1.81	1.76	1.82	1.44	1.30	1.34	1.16	0.87	0.44	0.40	0.54	0.55
Sawn softwood [7]	14.37	16.00	15.01	16.87	20.08	19.62	20.22	21.68	24.25	23.57	21.85	22.09	23.66	23.83	24.40
Sawn hardwood [7]	1.46	1.62	1.57	1.68	2.04	2.03	1.91	2.20	2.48	2.60	2.67	2.65	3.10	3.40	3.50
Plywood and veneers [7]	0.50	0.64	0.64	0.74	0.96	0.90	0.98	1.10	1.33	1.40	1.38	1.65	1.88	2.01	2.25
Fibreboard	0.32	0.39	0.39	0.44	0.50	0.52	0.59	0.65	0.75	0.69	0.65	0.74	0.77	0.78	0.80
Mechanical wood pulp	1.05	1.02	0.92	0.95	1.11	1.06	0.97	1.04	1.16	1.21	1.14	1.00	1.07	1.08	1.09
Chemical wood pulp	3.57	3.73	3.73	4.08	4.99	4.89	4.97	5.80	6.23	6.04	6.57	6.69	7.46	8.21	8.69
Newsprint	0.98	1.09	1.14	1.09	1.34	1.43	1.49	1.56	1.69	1.70	1.84	1.72	1.90	2.28	2.42
Other paper and paperboard	1.52	1.77	1.81	2.11	2.60	2.98	3.24	3.72	4.30	4.65	5.02	5.24	6.14	7.18	7.60

[1] Including paddy converted at 65 percent. – [2] Including refined sugar converted at 108.7 percent. – [3] Oranges, mandarines and lemons. – [4] Groundnuts, copra, palm kernels, soybeans, sunflowerseed, castor beans, cottonseed, olive oil, groundnut oil, coconut oil, palm oil, palm-kernel oil, soybean oil, sunflowerseed oil, castor oil, cottonseed oil. – [5] Million head. – [6] Beef and veal, mutton and lamb, pork, poultry meat. – [7] Million cubic metres.

ANNEX TABLE 2E. – WESTERN EUROPE: VOLUME OF EXPORTS OF MAJOR AGRICULTRAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat and wheat flour (wheat equivalent)	2.30	3.09	3.88	3.78	3.37	3.19	3.69	5.07	5.27	6.99	6.43	5.73	8.47	10.88	9.18
Barley	0.99	1.96	0.76	0.64	1.05	2.51	1.69	2.29	3.16	2.63	3.37	4.08	4.20	4.07	4.41
Maize	0.13	0.11	0.61	0.37	0.81	1.09	0.34	0.94	1.27	1.89	2.15	2.77	2.52	3.23	3.79
Rye	0.32	0.14	0.09	0.21	0.20	0.31	0.18	0.16	0.05	0.05	0.06	0.05	0.09	0.14	0.10
Sugar (raw equivalent) [1]	1.56	1.72	1.37	1.34	1.57	1.47	1.26	1.59	1.45	1.54	1.27	1.11	1.61	1.39	1.87
Potatoes	1.64	1.35	2.01	1.80	1.58	1.75	1.83	1.64	1.70	2.26	1.98	1.88	1.85	2.39	2.32
Pulses (dry)	0.18	0.17	0.21	0.19	0.17	0.19	0.22	0.17	0.15	0.17	0.19	0.24	0.29	0.29	0.28
Apples	0.53	0.73	0.38	0.79	0.71	0.84	0.88	0.53	0.73	0.88	0.76	0.78	0.86	0.94	0.92
Citrus fruit [2]	0.85	0.96	1.20	1.35	1.47	1.49	1.73	1.22	2.01	1.91	1.97	1.94	1.79	1.90	2.27
Grapes (fresh)	0.24	0.19	0.26	0.24	0.28	0.31	0.34	0.29	0.38	0.41	0.41	0.42	0.41	0.41	0.46
Vegetable oils and oilseeds (oil equivalent) [3]	0.34	0.31	0.28	0.31	0.44	0.38	0.40	0.37	0.40	0.32	0.35	0.46	0.52	0.68	0.87
Oilseed cake and meal	0.68	0.65	0.61	0.77	0.76	0.91	0.92	0.89	1.03	1.07	1.13	1.26	1.19	1.33	1.49
Cattle [4]	1.24	1.51	1.34	1.26	1.38	1.80	1.37	1.85	1.88	1.74	1.46	2.02	2.34	2.46	2.59
Sheep, lambs and goats [4]	0.38	0.67	0.47	0.57	0.86	1.17	0.87	1.35	0.87	0.85	0.58	0.72	0.93	1.00	0.67
Pigs [4]	0.37	0.25	0.32	0.58	0.80	0.58	0.49	0.39	0.66	0.82	0.49	0.83	1.14	1.53	2.11
Meat (fresh, chilled and frozen) [5]	0.23	0.30	0.32	0.40	0.51	0.58	0.74	0.81	0.79	0.92	0.91	1.10	1.21	1.25	1.31
Bacon, ham and salted pork	0.28	0.30	0.30	0.31	0.37	0.36	0.37	0.35	0.35	0.36	0.36	0.35	0.36	0.35	0.34
Milk (condensed, evaporated and powdered)	0.43	0.45	0.46	0.51	0.58	0.64	0.69	0.72	0.75	0.90	1.03	1.17	1.38	1.35	1.57
Butter	0.19	0.25	0.25	0.21	0.25	0.26	0.23	0.24	0.23	0.27	0.27	0.31	0.34	0.33	0.49
Cheese	0.25	0.26	0.29	0.32	0.33	0.34	0.36	0.38	0.40	0.42	0.47	0.48	0.51	0.53	0.74
Eggs (in the shell)	0.28	0.30	0.31	0.34	0.31	0.29	0.28	0.23	0.19	0.15	0.14	0.13	0.16	0.20	0.23
Wine	0.91	0.88	1.17	0.75	0.91	1.01	1.01	1.26	1.21	1.19	1.30	1.31	1.38	1.43	1.82
Wool (actual weight)	0.08	0.09	0.08	0.11	0.11	0.11	0.12	0.13	0.10	0.11	0.11	0.10	0.11	0.10	0.10
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh, chilled or frozen fish	509.6	531.6	593.2	639.2	694.0	684.5	771.7	849.9	877.0	907.7	876.5	861.2	905.6	972.1	1 093.0
Dried, salted or smoked fish	466.0	417.0	391.0	346.2	331.0	333.3	353.8	334.3	314.7	323.2	317.4	312.4	311.8	335.9	342.0
Crustacea and molluscs, fresh, frozen, dried, salted, etc.	87.2	74.8	84.9	108.5	109.2	112.5	123.4	114.0	118.9	108.8	113.7	116.7	130.4	133.6	152.5
Fish products and preparations, whether or not in airtight containers	166.8	166.8	177.6	197.0	191.0	183.7	211.7	196.7	209.1	221.4	211.3	193.8	196.0	171.5	190.0
Crustacean and mollusc products and preparations, whether or not in airtight containers	5.0	5.0	6.0	7.0	6.0	8.0	9.0	9.0	13.0	13.0	13.0	13.0	13.0	17.0	20.0
Oils and fats, crude or refined, of aquatic animal origin	104.8	216.8	213.7	228.4	213.7	218.8	243.9	199.8	190.0	266.2	340.1	391.6	263.0	270.0	171.1
Meals, solubles and similar animal feedstuffs of aquatic animal origin	284.0	253.0	266.0	252.8	234.6	286.2	240.2	306.9	434.8	555.0	576.8	810.4	788.4	658.2	593.5
	Million metric tons														
FOREST PRODUCTS															
Pulpwood [6]	4.60	4.55	3.76	3.93	4.88	6.10	4.42	3.46	3.62	3.61	3.01	3.82	4.17	5.07	6.30
Coniferous logs [6]	0.72	0.70	0.97	1.03	1.34	1.30	1.14	1.05	1.06	1.03	1.35	1.55	1.37	1.21	1.45
Broadleaved logs [6]	0.68	0.68	0.59	0.79	1.04	0.98	0.93	0.91	0.97	1.02	1.10	1.17	1.20	1.23	1.31
Pitprops [6]	2.86	2.90	2.32	1.90	1.62	1.81	1.37	1.07	0.83	0.56	0.54	0.36	0.39	0.49	0.50
Sawn softwood [6]	12.54	13.02	11.86	13.51	15.35	14.24	13.86	13.86	14.62	13.57	12.72	12.85	15.05	16.23	15.90
Sawn hardwood [6]	0.72	0.82	0.79	0.87	1.06	0.93	0.96	0.98	1.14	1.21	1.26	1.23	1.35	1.45	1.53
Plywood and veneers [6]	0.45	0.50	0.48	0.61	0.70	0.65	0.66	0.73	0.83	0.86	0.88	0.92	1.05	1.16	1.20
Fibreboard	0.47	0.53	0.56	0.66	0.74	0.75	0.78	0.83	0.88	0.82	0.76	0.82	0.86	0.89	0.86
Particle board	0.05	0.06	0.09	0.16	0.23	0.28	0.33	0.38	0.46	0.73	0.81	1.03	1.19	1.47	1.60
Mechanical wood pulp	1.06	1.02	0.88	0.93	1.10	1.06	0.97	1.05	1.15	1.12	1.13	1.00	1.06	1.04	1.05
Chemical wood pulp	3.86	3.84	3.90	4.36	4.73	4.50	4.80	5.36	5.86	5.79	6.24	6.15	6.54	6.73	6.65
Newsprint	1.26	1.24	1.30	1.32	1.51	1.62	1.63	1.71	1.88	1.97	2.07	2.10	2.31	2.43	2.55
Other paper and paperboard	2.34	2.57	2.49	2.84	3.25	3.57	3.77	4.23	4.77	5.06	5.54	5.67	6.49	7.74	8.25

[1] Including refined sugar converted at 108.7 percent. – [2] Oranges, mandarines and lemons. – [3] Linseed, sunflowerseed, olive oil, groundnut oil, coconut oil, palm oil, palm-kernel oil, soybean oil, sunflowerseed oil, castor oil, cottonseed oil, linseed oil. – [4] Million head. – [5] Beef and veal, mutton and lamb, pork, poultry meat. – [6] Million cubic metres.

ANNEX TABLE 2F. – WESTERN EUROPE: INDICES OF VOLUME AND VALUE OF EXPORTS AND IMPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS, BY COMMODITY GROUPS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	1957-59 average = 100														
Export volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	92	98	99	103	115	121	121	129	135	143	148	157	173	184	200
Agricultural products	89	98	100	102	114	124	123	133	137	147	153	164	182	193	216
Food and feed	87	98	99	103	116	127	126	133	140	152	156	171	192	204	228
Beverages and tobacco	94	98	118	84	98	107	101	121	121	121	129	134	133	137	168
Raw materials	100	94	89	116	110	117	130	142	113	113	117	118	128	122	117
Fishery products	95	97	100	103	104	108	114	115	120	133	135	141	140	146	151
Forest products	97	99	95	106	120	119	119	126	137	139	143	146	164	178	182
Sawnwood	98	102	93	105	120	111	109	109	116	108	103	103	120	129	128
Pulp and paper	97	97	97	106	118	120	124	137	152	159	170	171	191	206	211
Export value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	95	102	97	100	112	116	118	132	146	158	162	169	178	204	230
Agricultural products	91	101	98	100	111	116	120	139	151	163	168	182	190	218	249
Food and feed	91	101	98	102	113	118	121	139	153	169	172	188	197	229	261
Beverages and tobacco	86	101	110	89	100	109	116	145	149	150	162	180	177	194	235
Raw materials	110	113	84	103	104	108	117	133	117	102	109	100	102	101	93
Fishery products	94	98	99	103	104	111	123	125	141	170	179	176	171	193	228
Forest products	103	106	95	99	115	118	114	121	139	146	147	143	158	180	194
Sawnwood	102	107	93	100	118	115	110	113	127	128	120	101	123	148	152
Pulp and paper	104	105	96	99	112	114	113	124	146	154	160	162	173	191	210
Import volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	95	100	97	103	111	112	118	121	126	130	134	134	139	145	150
Agricultural products	96	100	97	103	107	109	114	116	118	122	127	126	128	133	137
Food and feed	96	97	98	105	109	110	118	121	124	133	138	138	139	145	150
Beverages and tobacco	93	100	101	99	109	114	120	120	123	123	126	127	131	135	144
Raw materials	99	108	93	99	103	101	101	100	101	97	102	96	99	103	100
Fishery products	91	92	99	109	125	130	147	153	166	175	167	182	201	193	192
Forest products	92	99	96	105	128	130	132	145	161	164	163	167	186	203	209
Sawnwood	92	101	95	104	125	123	124	134	150	147	138	139	151	155	159
Pulp and paper	93	98	98	104	127	131	133	151	167	174	181	182	207	232	245
Import value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	100	106	96	98	107	107	112	122	132	138	142	139	138	152	165
Agricultural products	101	106	96	98	104	102	108	117	124	128	133	130	126	137	147
Food and feed	101	102	95	103	106	106	115	130	138	150	157	155	147	161	175
Beverages and tobacco	91	101	105	94	98	98	102	103	114	111	114	115	118	129	147
Raw materials	107	120	88	89	101	95	93	95	99	88	92	81	79	86	79
Fishery products	91	94	98	108	112	119	142	164	171	204	203	208	210	233	262
Forest products	98	105	96	98	126	133	131	144	170	179	175	173	189	218	244
Sawnwood	100	108	95	97	126	130	127	140	168	173	162	156	166	185	200
Pulp and paper	97	104	98	98	122	126	124	140	162	173	174	173	193	228	263

ANNEX TABLE 2G. – WESTERN EUROPE: ESTIMATED CALORIE AND PROTEIN CONTENT OF NATIONAL AVERAGE FOOD SUPPLY PER CAPUT

	Calories					Total protein					Animal protein				
	Pre-war	1948/-1950/	1960/-1962/	1966/-1968/	1969/1970	Pre-war	1948/-1950/	1960/-1962/	1966/-1968/	1969/1970	Pre-war	1948/-1950/	1960/-1962/	1966/-1968/	1969/1970
	Number per day					*Grammes per day*									
Austria	2 930	2 670	2 970	2 950	2 950	88.3	77.2	86.8	86.5	87.0	40.9	30.2	47.5	50.2	51.9
Belgium-Luxembourg	2 820	2 880	3 060	3 140	[1]3 150	83.7	83.1	88.5	89.9	[1]91.5	35.3	37.7	47.9	51.9	[1]53.3
Denmark	3 450	3 160	3 260	3 190	3 140	93.2	104.9	88.4	89.6	88.8	56.8	59.8	56.3	60.6	61.3
Finland	3 000	[2]2 980	3 110	2 920	2 960	95.2	[2]96.2	93.8	88.5	91.3	43.8	[2]51.6	54.5	56.5	60.8
France	2 880	2 800	3 090	3 160	3 270	94.9	92.4	99.2	100.9	103.7	40.9	40.3	53.4	60.8	64.3
Germany, Fed. Rep. of [3]	3 040	2 730	2 990	2 940	2 940	84.8	79.5	80.5	81.0	82.2	42.5	32.1	49.2	52.4	53.9
Greece	2 600	2 500	2 940	[4]2 900	...	83.6	76.3	96.3	[4]98.9	...	23.0	16.6	31.3	[4]43.0	...
Ireland [5]	3 400	3 430	3 480	3 450	[6]3 450	98.5	100.6	91.6	93.2	[6]93.2	47.4	47.6	54.7	59.0	[6]58.9
Italy	2 510	2 350	2 690	2 900	[7]2 950	76.6	69.7	78.7	87.1	[7]88.0	20.3	19.3	29.8	37.1	[7]38.2
Netherlands	2 960	2 950	3 160	3 040	[1]3 030	82.3	80.6	84.9	83.5	[1]84.2	40.1	38.6	50.4	52.9	[1]53.7
Norway	3 210	3 110	2 930	2 930	[1]2 900	89.7	99.5	82.1	81.6	[1]81.7	49.1	53.2	49.7	50.6	[1]51.4
Portugal [5]	2 040	2 270	2 530	2 720	[8]2 730	59.4	67.8	72.5	80.1	[8]79.4	20.4	22.1	27.3	31.9	[8]32.1
Spain	...	...	2 820	2 780	2 750	...	...	77.8	80.3	83.6	...	...	24.0	32.8	36.9
Sweden	3 120	3 110	2 980	2 820	2 750	91.9	86.9	82.4	79.5	79.4	53.4	52.5	54.0	54.0	54.8
Switzerland	3 140	3 170	3 210	[9]2 990	...	95.7	95.9	90.2	[9]84.3	...	53.9	50.8	51.4	[9]51.1	...
United Kingdom	3 110	3 130	3 270	3 180	[1]3 180	80.2	90.3	88.9	87.9	[1]88.0	43.9	45.1	53.4	53.8	[1]54.0
Yugoslavia [5]	...	...	2 970	3 170	[6]3 130	...	...	90.4	92.0	[6]91.1	...	...	20.4	21.6	[6]22.6

[1] 1968/69. – [2] 1949/-50/. – [3] Since 1959/60 including the Saar. – [4] 1967. – [5] Calendar years instead of split years. – [6] 1968. – [7] 1968-69. – [8] 1969. – [9] 1967/68.

ANNEX TABLE 3A. – EASTERN EUROPE AND U.S.S.R.: BASIC DATA ON NATIONAL AGRICULTURE

	Period	Population in agriculture		Agricultural net material product			Share of agriculture in value of total trade		Arable land per person in agriculture	Fertilizer consumption per hectare of arable land
							Exports	Imports		
		Thousands	*Percent of total*	*Million dollars*	*Percent of total*	*Dollars per caput*	..... *Percent*		*Hectares per caput*	*Kilogramme per hectare*
Albania	1950	...	...	...	...	...	...	...	...	...
	1960	...	...	...	...	...	...	...	...	...
	1965	1 095	59	...	...	...	...	...	...	16
	1968	1 141	57	...	...	...	...	...	0.49	[1]67
Bulgaria	1950	...	...	...	[2]30	...	...	...	...	2
	1960	[3]4 198	55	...	32	...	...	...	...	34
	1965	3 690	45	...	34	...	...	...	1.24	79
	1968	4 671	56	...	26	...	...	...	1.00	163
Czechoslovakia	1950	3 076	25	...	17	...	...	...	1.79	38
	1960	2 416	18	...	16	...	...	...	2.25	91
	1965	2 830	20	...	13	...	7	28	2.22	178
	1968	2 222	15	...	13	...	7	25	2.41	207
German Democratic Republic	1950	3 488	21	...	33	...	...	...	...	...
	1960	...	...	...	17	...	...	...	...	197
	1965	3 050	19	...	14	...	...	...	1.54	262
	1968	2 931	17	...	14	...	...	...	1.70	[1]298
Hungary	1950	...	...	...	25	...	...	...	...	6
	1960	3 583	36	...	23	...	...	...	1.59	29
	1965	2 915	29	...	20	...	25	25	1.93	63
	1968	2 852	28	...	23	...	22	22	1.97	112
Poland	1950	11 597	47	...	46	...	...	...	...	...
	1960	11 244	38	...	26	...	...	...	1.44	49
	1965	11 250	36	...	23	...	21	26	1.42	82
	1968	10 866	34	...	21	...	16	22	1.43	138
Romania	1950	...	...	...	28	...	...	...	...	1
	1960	11 206	38	...	33	...	...	...	0.92	7
	1965	11 380	60	...	29	...	...	...	0.92	25
	1968	11 593	59	...	26	...	...	...	0.91	46
U.S.S.R.	1950	90 000	50	...	...	...	...	...	2.50	5
	1960	...	...	...	21	...	...	...	...	10
	1965	73 271	32	...	22	...	21	28	3.30	23
	1968	70 593	30	...	21	...	21	20	3.18	33

[1] 1967. – [2] 1953. – [3] 1956.

ANNEX TABLE 3B. – EASTERN EUROPE AND U.S.S.R.: VOLUME OF PRODUCTION OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1959	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat	78.23	71.41	88.43	83.06	77.23	80.04	84.70	63.15	88.83	78.27	118.62	98.12	114.43	100.58	118.75
Rye	24.79	25.88	26.99	28.81	27.81	28.05	26.73	21.92	23.78	27.65	23.65	23.65	25.58	21.66	20.63
Barley	17.57	13.83	17.79	15.81	22.37	19.24	25.91	25.95	34.73	27.18	34.88	32.38	36.93	41.53	46.70
Oats	18.26	18.05	18.68	18.68	17.53	14.30	10.83	8.79	9.48	10.37	13.70	16.61	16.48	18.26	18.93
Millet and sorghum	4.70	1.71	3.02	1.43	3.35	3.01	2.90	1.96	3.62	2.31	3.27	3.36	2.77	3.43	2.19
Maize	17.58	16.43	18.31	17.16	21.15	27.68	25.86	23.27	26.82	19.33	23.32	22.27	22.20	27.61	22.99
Pulses	1.19	1.30	1.33	1.55	2.03	2.90	6.06	7.28	9.29	5.53	5.77	5.16	5.44	6.04	5.73
Cotton (lint)	1.52	1.48	1.52	1.63	1.48	1.54	1.51	1.78	1.82	1.96	2.09	2.07	2.01	1.94	2.33
Flax (fibre)	0.62	0.52	0.51	0.43	0.51	0.49	0.54	0.48	0.44	0.58	0.56	0.61	0.51	0.59	0.54
Sugar (centrifugal)	6.65	8.80	9.84	8.86	10.37	10.64	10.16	10.09	14.87	13.00	13.32	14.89	14.21	12.65	12.92
Vegetable oils and oilseeds (oil equivalent) [1]	2.29	1.94	2.57	2.23	2.57	2.99	3.10	3.00	3.73	3.79	4.26	4.62	4.65	4.23	4.44
Sunflowerseed	4.55	3.39	5.26	3.96	4.92	5.65	5.74	5.26	7.03	6.45	7.35	7.89	7.98	7.77	7.35
Potatoes	162.58	153.06	145.38	147.08	148.65	148.45	130.91	141.52	167.15	152.14	159.11	169.23	177.49	155.38	169.06
Milk, total	73.44	80.67	86.24	90.19	90.53	91.77	92.16	89.40	91.98	102.93	108.49	113.47	116.28	115.65	117.11
Meat, total [2]	9.00	9.75	10.30	11.29	11.25	11.52	12.11	12.60	11.42	13.14	13.95	14.88	15.17	15.31	15.76
Wool (greasy)	0.32	0.35	0.39	0.42	0.43	0.44	0.44	0.45	0.42	0.43	0.45	0.48	0.50	0.48	0.51
Eggs	1.75	1.95	2.01	2.19	2.41	2.57	2.58	2.47	2.45	2.65	2.80	3.00	3.08	3.19	3.42
FISHERY PRODUCTS [3]	2.87	2.82	2.91	3.08	3.40	3.63	4.02	4.47	5.05	5.73	6.02	6.51	6.93	7.38	8.21
FOREST PRODUCTS															
Fuelwood [4]	139.8	142.7	141.5	145.0	125.3	114.6	112.6	118.1	124.2	120.3	117.8	112.6	106.3	106.5	106.5
Coniferous logs [4]	133.5	138.5	154.7	168.5	170.7	171.5	171.3	173.0	178.1	145.5	144.4	154.7	156.0	159.6	161.0
Broadleaved logs [4]	26.0	27.7	31.3	33.8	34.3	32.3	34.1	34.4	35.5	30.4	31.2	33.1	33.2	33.7	34.2
Other industrial roundwood [4]	114.3	122.2	114.7	116.7	106.1	101.1	104.2	112.8	116.7	151.3	151.0	155.0	158.0	159.0	162.5
Sawn softwood [4]	81.4	85.7	95.4	104.1	105.3	104.1	104.3	105.1	108.7	109.0	105.8	107.4	108.1	109.7	110.0
Sawn hardwood [4]	14.5	15.6	17.9	19.5	20.0	20.2	20.6	21.1	21.9	21.8	21.5	22.0	22.3	22.7	22.7
Plywood [4]	1.6	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.4	2.4	2.5	2.6	2.6	2.6	2.8
Particle board	0.1	0.1	0.1	0.2	0.4	0.7	0.9	1.1	1.4	1.7	2.0	2.5	2.8	3.1	3.5
Fibreboard	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2	1.3	1.4	1.5
Mechanical wood pulp	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.7	1.7	1.7	2.0	2.0	2.1	2.1	2.1
Chemical wood pulp	2.8	3.0	3.2	3.3	3.7	3.9	4.1	4.3	4.3	4.6	5.1	5.7	6.1	6.3	6.7
Newsprint	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.9	1.0	1.2	1.3	1.3	1.4	1.5
Printing and writing paper	1.0	1.1	1.1	1.2	1.2	1.3	1.4	1.4	1.5	1.5	1.6	1.8	1.9	1.9	2.0

[1] Olive oil, soybeans, groundnuts, cottonseed, rapeseed, sesame seed, sunflowerseed, castor beans, hempseed, linseed. – [2] Beef and veal, mutton and lamb, pork, poultry meat. – [3] Nominal catch (liveweight). – [4] Million cubic metres.

ANNEX TABLE 3C. – EASTERN EUROPE AND U.S.S.R.: INDICES OF FOOD AND TOTAL AGRICULTURAL PRODUCTION

	Total agricultural production							Food production						
	1964	1965	1966	1967	1968	1969	1970 (Preliminary)	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	1952-56 average = 100													
Total production	145	148	165	166	173	168	178	146	149	167	168	176	171	180
Per caput production	126	127	141	141	145	139	146	127	128	143	142	147	141	147

ANNEX TABLE 3D. – EASTERN EUROPE AND U.S.S.R.: VOLUME OF IMPORTS OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat and wheat flour (wheat equivalent)	3.18	5.13	3.66	5.09	5.57	5.46	4.18	8.21	15.09	10.80	12.58	10.17	5.85	4.91	...
Barley	0.77	1.10	0.61	0.49	0.43	0.69	0.67	0.89	1.17	1.93	0.44	0.81	0.97	0.84	...
Maize	0.54	0.15	0.69	0.39	0.64	0.61	1.32	0.96	1.20	1.22	1.08	1.09	1.35	1.43	...
Rye	0.84	0.40	0.49	0.39	0.54	0.76	0.87	0.78	0.15	0.06	0.23	0.28	0.22	0.26	...
Rice (milled equivalent) [1]	0.81	0.62	0.76	1.10	0.93	0.24	0.55	0.50	0.63	0.50	0.53	0.65	0.51	0.56	...
Sugar (raw equivalent) [2]	0.42	0.76	0.49	0.46	2.03	4.22	3.42	1.91	2.18	2.96	2.53	3.23	2.67	1.12	...
Citrus fruit [3]	0.15	0.20	0.25	0.26	0.23	0.24	0.27	0.27	0.37	0.45	0.54	0.59	0.62	0.69	...
Vegetable oils and oilseeds (oil equivalent) [4]	0.36	0.40	0.33	0.39	0.38	0.39	0.37	0.40	0.48	0.44	0.49	0.47	0.50	0.45	...
Sheep, lambs and goats [5]	2.23	1.52	1.66	1.58	1.74	1.76	1.38	1.25	1.15	1.41	1.93	1.67	1.09	0.95	...
Meat (fresh, chilled and frozen) [6]	0.23	0.16	0.22	0.25	0.21	0.17	0.26	0.22	0.25	0.34	0.29	0.27	0.24	0.20	...
Coffee (green)	0.02	0.03	0.03	0.06	0.06	0.08	0.07	0.09	0.10	0.11	0.12	0.12	0.14	0.17	...
Cocoa beans	0.04	0.07	0.04	0.08	0.10	0.07	0.10	0.11	0.13	0.16	0.12	0.16	0.19	0.17	...
Wine	0.08	0.11	0.13	0.12	0.18	0.19	0.18	0.22	0.25	0.26	0.31	0.41	0.48	0.90	...
Tobacco (unmanufactured)	0.13	0.15	0.14	0.16	0.13	0.12	0.13	0.16	0.20	0.17	0.13	0.13	0.13	0.11	...
Cotton (lint)	0.40	0.50	0.54	0.62	0.67	0.66	0.66	0.71	0.68	0.71	0.74	0.68	0.70	0.70	...
Rubber (natural)	0.20	0.21	0.34	0.35	0.34	0.52	0.48	0.45	0.35	0.43	0.48	0.44	0.50	0.48	...
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh, chilled or frozen fish	182.9	186.2	190.2	182.5	201.7	130.8	153.4	153.7	146.1	145.6	159.4	138.4	84.6	75.4	130.2
Dried, salted or smoked fish	126.9	114.4	106.1	104.7	76.1	43.9	51.6	56.4	45.8	26.8	19.7	20.9	15.9	6.3	19.1
Fish products and preparations, whether or not in airtight containers	15.3	16.5	19.8	28.8	31.8	28.9	31.1	26.0	27.6	23.8	21.4	28.4	32.9	9.6	25.5
Oils and fats, crude or refined, of aquatic animal origin	51.9	46.2	41.3	49.2	35.7	49.1	61.4	84.9	75.2	65.4	52.7	23.4	6.7	6.5	16.1
Meals, solubles and similar animal feedstuffs of aquatic animal origin	16.2	16.5	18.4	28.0	32.1	55.2	86.4	163.0	197.7	292.3	292.5	314.7	321.0	366.2	248.0
	Million metric tons														
FOREST PRODUCTS															
Sawn softwood [7]	1.35	1.97	1.81	1.79	1.92	1.84	2.16	2.32	2.41	2.66	2.55	2.65	2.86	2.79	2.73
Sawn hardwood [7]	0.27	0.27	0.31	0.31	0.38	0.38	0.40	0.36	0.43	0.43	0.44	0.48	0.46	0.44	0.44
Pulp and pulp products	0.41	0.55	0.56	0.55	0.61	0.72	0.77	0.79	0.95	1.15	1.22	1.53	1.72	1.93	2.27

[1] Including paddy converted at 65 percent. – [2] Including refined sugar converted at 108.7 percent. – [3] Oranges, mandarines and lemons. – [4] Groundnuts, copra, palm kernels, soybeans, sunflowerseed, castor beans, linseed, cottonseed, olive oil, groundnut oil, coconut oil, palm oil, palm-kernel oil, soybean oil, sunflowerseed oil, castor oil, linseed oil, cottonseed oil. – [5] Million head. – [6] Beef and veal, mutton and lamb, pork, poultry meat. – [7] Million cubic metres.

ANNEX TABLE 3E. – EASTERN EUROPE AND U.S.S.R.: VOLUME OF EXPORTS OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat and wheat flour (wheat equivalent)	1.74	5.63	4.11	6.34	5.86	5.46	5.18	4.97	2.52	2.32	4.12	7.53	6.70	8.01	...
Barley	0.91	1.33	0.38	0.19	0.43	1.18	0.61	0.69	0.76	2.14	0.39	0.53	0.67	0.82	...
Maize	0.84	0.26	0.73	0.27	0.70	1.30	2.33	1.78	1.93	1.34	0.64	1.42	0.55	0.98	...
Rye	0.67	0.45	0.47	0.55	0.76	1.15	1.35	0.89	0.17	0.06	0.32	0.44	0.28	0.38	...
Sugar (raw equivalent) [1]	0.54	0.62	1.10	1.36	1.33	3.21	3.28	2.19	1.71	2.02	2.17	2.42	2.68	2.13	...
Potatoes	0.09	0.12	0.17	0.31	0.25	0.40	0.66	0.46	1.15	0.65	0.62	0.67	0.68	0.27	...
Sunflowerseed	0.08	0.06	0.06	0.12	0.18	0.17	0.22	0.15	0.24	0.19	0.35	0.49	0.47	0.56	...
Oilseed cake and meal	0.15	0.22	0.38	0.59	0.53	0.42	0.39	0.24	0.08	0.16	0.43	0.40	0.34	0.31	...
Meat (fresh, chilled and frozen) [2]	0.09	0.12	0.10	0.31	0.14	0.20	0.27	0.27	0.17	0.24	0.25	0.35	0.34	0.30	...
Butter	0.03	0.05	0.06	0.11	0.08	0.09	0.11	0.10	0.06	0.08	0.10	0.12	0.12	0.10	...
Eggs (in the shell)	0.05	0.04	0.06	0.07	0.10	0.13	0.11	0.08	0.08	0.11	0.09	0.13	0.10	0.10	...
Cotton	0.32	0.32	0.32	0.35	0.40	0.39	0.35	0.32	0.39	0.46	0.52	0.55	0.57	0.45	...
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh, chilled or frozen fish	1.0	1.2	2.5	5.5	9.9	17.9	33.7	80.9	88.9	178.3	229.5	215.8	236.4	229.9	269.2
Dried, salted or smoked fish	1.2	1.0	13.0	34.8	45.3	31.7	40.5	44.4	35.3	39.9	28.6	35.6	25.2	23.1	21.4
Fish products and preparations, whether or not in airtight containers	7.5	9.3	9.4	18.0	22.0	25.3	24.3	19.3	18.9	19.6	22.7	24.2	27.0	28.5	29.0
Crustacean and mollusc products and preparations, whether or not in airtight containers	5.7	3.8	4.2	4.2	3.7	3.7	3.0	5.0	5.6	4.9	5.0	5.0	5.0	3.0	4.0
Oils and fats, crude or refined, of aquatic animal origin	6.3	4.6	5.3	8.6	35.9	18.2	15.2	32.2	40.0	57.1	71.9	58.2	59.4	64.0	35.0
Meals, solubles and similar animal feedstuffs of aquatic animal origin	3.6	3.2	3.8	7.2	4.0	4.9	3.7	3.8	4.2	7.2	14.2	38.6	30.6	28.8	13.6
	Million metric tons														
FOREST PRODUCTS															
Pulpwood [3]	1.12	1.15	1.25	1.93	2.63	3.54	4.40	5.13	6.00	6.38	7.32	7.49	6.88	7.58	9.20
Coniferous logs [3]	0.28	0.75	1.06	1.22	1.61	1.99	2.62	2.89	3.43	4.72	5.04	5.01	6.12	6.38	7.32
Pitprops [3]	0.80	1.03	1.27	1.07	1.33	1.24	1.36	1.58	1.53	1.58	1.31	0.96	0.85	0.85	0.82
Sawn softwood [3]	3.56	5.21	5.36	5.94	6.82	7.23	8.47	9.49	10.96	11.17	11.44	10.88	10.93	10.74	10.70
Plywood [3]	0.09	0.14	0.14	0.16	0.19	0.21	0.25	0.28	0.29	0.38	0.38	0.40	0.45	0.45	0.45
Chemical wood pulp	0.17	0.18	0.25	0.24	0.29	0.33	0.34	0.32	0.37	0.37	0.39	0.47	0.51	0.57	0.57

[1] Including refined sugar converted at 108.7 percent. – [2] Beef and veal, mutton and lamb, pork, poultry meat. – [3] Million cubic metres.

ANNEX TABLE 3F. – EASTERN EUROPE AND U.S.S.R.: INDICES OF VOLUME AND VALUE OF EXPORTS AND IMPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS, BY COMMODITY GROUPS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	1957-59 average = 100														
Export volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	68	90	92	118	121	146	157	152	145	167	182	208	210	209	...
Agricultural products	68	90	90	120	118	146	154	141	125	148	161	196	193	191	...
Food and feed	59	88	88	124	115	155	169	147	118	145	160	203	198	205	...
Beverages and tobacco	85	90	93	117	133	120	111	149	176	168	157	181	176	169	...
Raw materials	95	97	96	107	120	124	117	112	129	151	166	172	182	148	...
Fishery products	78	70	85	145	191	193	211	289	301	435	530	514	532	509	571
Forest products	69	93	99	108	129	141	162	178	203	215	229	230	243	248	260
Roundwood	60	81	100	119	106	181	220	244	278	323	359	360	382	400	456
Sawnwood	68	96	97	107	126	135	154	171	194	197	204	195	199	196	195
Export value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	71	94	91	115	118	138	148	154	149	168	182	206	204	218	...
Agricultural products	71	93	89	118	114	138	145	149	134	153	165	198	188	199	...
Food and feed	62	90	87	124	112	146	159	159	133	153	169	209	193	217	...
Beverages and tobacco	80	91	94	115	132	115	103	151	172	168	167	197	191	187	...
Raw materials	105	108	97	95	114	120	110	108	123	145	149	150	166	134	...
Fishery products	78	75	89	136	163	165	169	210	212	256	300	308	340	341	368
Forest products	72	97	97	105	125	136	154	167	196	215	231	227	250	275	292
Roundwood	63	86	101	113	137	180	219	221	267	326	368	366	410	459	535
Sawnwood	71	104	95	105	124	130	145	163	191	200	209	193	209	226	227
Import volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	82	95	96	110	116	127	129	136	165	166	160	158	151	149	...
Agricultural products	81	94	95	111	117	129	129	137	168	167	162	157	148	145	...
Food and feed	88	98	92	109	121	139	136	143	201	192	187	180	147	138	...
Beverages and tobacco	76	96	91	113	109	99	108	133	161	160	141	152	166	188	...
Raw materials	74	87	102	111	116	128	129	131	122	134	135	123	141	135	...
Fishery products	100	96	96	107	101	86	103	122	122	127	121	119	109	92	100
Forest products	83	101	99	99	110	125	135	130	149	161	159	184	197	214	239
Sawnwood	75	104	100	96	106	111	122	116	125	136	131	139	146	139	139
Pulp and paper	95	101	99	100	112	152	162	166	201	229	212	272	292	360	428
Import value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	86	100	94	106	114	121	121	135	171	166	161	154	144	150	...
Agricultural products	85	99	94	107	115	122	121	136	175	166	160	152	139	145	...
Food and feed	90	102	91	107	115	131	129	152	220	203	198	189	152	149	...
Beverages and tobacco	73	94	94	112	103	89	94	119	152	143	128	142	156	191	...
Raw materials	84	97	98	105	119	123	120	120	117	122	119	101	111	116	...
Fishery products	92	100	98	102	100	86	105	126	124	139	149	134	128	100	111
Forest products	88	108	98	94	107	126	131	125	151	168	166	187	203	231	270
Sawnwood	80	110	99	91	105	112	118	113	131	148	144	147	161	166	170
Pulp and paper	98	106	98	96	108	147	150	154	195	226	203	257	271	348	452

ANNEX TABLE 3G. – EASTERN EUROPE AND U.S.S.R.: ESTIMATED CALORIE AND PROTEIN CONTENT OF NATIONAL AVERAGE FOOD SUPPLY PER CAPUT

	Calories			Total protein			Animal protein		
	1960-1962	1964-1966	1969	1960-1962	1964-1966	1969	1960-1962	1964-1966	1969
	Number per day			*Grammes per day*					
Albania	...	2 370	...	...	71.3	...	...	21.2	...
Bulgaria	...	3 070	...	...	90.8	...	...	25.0	...
Czechoslovakia	...	3 030	...	...	83.3	...	...	38.7	...
German Democratic Rep.	...	3 040	...	...	76.4	...	...	40.7	...
Hungary	3 030	[1]3 050	3 180	91.7	[1]94.3	97.4	37.2	[1]37.9	42.2
Poland	...	3 140	...	...	93.2	...	...	42.6	...
Romania	...	3 010	...	...	87.0	...	...	26.2	...
U.S.S.R.	...	3 180	...	...	92.2	...	...	35.8	...

[1] 1963-65.

ANNEX TABLE 4A. – NORTH AMERICA: BASIC DATA ON NATIONAL AGRICULTURE

	Period	Population in agriculture		Agricultural GDP			Share of agriculture in value of total trade		Arable land per person in agriculture	Fertilizer consumption per hectare of arable land
							Exports	Imports		
		Thousands	*Percent of total*	*Million dollars*	*Percent of total*	*Dollars per caput*	..... *Percent*		*Hectares per caput*	*Kilogrammes per hectare*
Canada	1950	[1] 2 632	16	2 018	13	...	[2] 51	[2] 21	...	5
	1960	[2] 2 073	11	2 328	7	1 123	36	16	20.19	9
	1965	1 765	9	2 549	6	1 444	35	13	24.59	17
	1968	1 740	8	3 212	6	1 846	24	10	24.94	18
United States	1950	[4] 22 158	13	20 097	7	...	29	59	...	23
	1960	[5] 14 313	8	20 360	4	1 422	26	36	12.94	39
	1965	11 700	6	20 763	3	1 775	26	28	15.37	64
	1968	11 531	6	23 102	3	2 003	21	23	15.30	80

[1] 1956. – [2] 1951. – [3] 1961. – [4] 1955. – [5] 1962.

ANNEX TABLE 4B. – NORTH AMERICA: VOLUME OF PRODUCTION OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	..... *Million metric tons*														
AGRICULTURAL PRODUCTS															
Wheat	42.96	36.70	50.50	42.53	50.98	41.25	45.11	50.90	51.28	53.48	58.22	57.57	60.58	58.36	46.54
Barley	14.06	14.34	15.57	13.85	13.55	11.00	12.93	13.37	12.07	13.30	15.12	13.54	16.30	17.46	17.99
Oats	23.92	23.61	25.67	20.55	22.89	19.05	22.29	20.89	17.72	19.62	17.41	16.15	19.23	19.52	18.87
Maize	78.82	78.11	86.01	97.93	99.90	92.13	92.45	103.01	89.85	105.26	106.27	122.79	113.66	118.27	106.94
Sorghum	5.20	14.42	14.76	14.11	15.75	12.20	12.96	14.87	12.44	17.09	18.16	19.20	18.79	18.98	17.71
Rice (milled equivalent) [1]	1.46	1.27	1.32	1.58	1.61	1.60	1.95	2.07	2.16	2.25	2.51	2.64	3.07	2.68	2.44
Sugar (centrifugal)	3.41	3.58	3.38	3.70	3.79	4.08	4.28	5.04	5.25	4.87	4.94	4.93	5.52	5.20	5.21
Potatoes	13.09	13.01	13.92	12.76	13.62	15.32	14.16	14.41	13.10	15.30	16.42	15.99	15.75	16.51	17.20
Apples	2.46	2.92	3.12	2.92	2.54	2.92	2.99	3.08	3.28	3.24	2.99	2.89	2.88	3.49	3.28
Citrus fruit	7.61	6.47	7.45	7.28	6.93	7.88	5.95	5.66	6.93	7.97	10.37	7.56	10.18	10.31	10.89
Soybeans	12.37	13.33	15.97	14.69	15.24	18.65	18.39	19.16	19.27	23.23	25.52	26.78	30.27	30.86	31.19
Cottonseed	4.91	4.18	4.35	5.44	5.34	5.42	5.57	5.62	5.66	5.52	3.59	2.91	4.21	3.80	3.89
Total vegetable oils and oilseeds (oil equivalent) [2]	4.09	3.80	4.50	4.18	4.48	4.96	5.01	5.25	5.27	6.26	6.21	6.20	7.17	7.46	8.07
Tobacco	1.06	0.83	0.88	0.89	0.98	1.03	1.14	1.15	1.08	0.92	0.96	0.99	0.88	0.93	0.96
Cotton (lint)	2.90	2.39	2.51	3.17	3.11	3.12	3.24	3.34	3.31	3.26	2.09	1.62	2.38	2.18	2.21
Milk (total)	64.40	64.45	63.98	63.39	63.96	65.35	65.62	65.16	66.00	64.66	62.73	62.14	61.53	61.27	61.57
Meat [3]	17.05	16.67	16.59	17.68	18.00	18.83	18.90	19.83	21.07	21.00	22.00	23.02	23.44	24.09	25.17
Eggs	4.17	4.16	4.16	4.25	4.09	4.09	4.12	4.07	4.14	4.17	4.21	4.43	4.38	4.40	4.49
FISHERY PRODUCTS [4]	4.13	3.80	3.75	3.98	3.75	3.95	4.10	3.97	3.82	3.93	3.87	3.71	3.94	3.87	4.09
FOREST PRODUCTS															
Fuelwood [5]	59.8	58.3	55.8	54.0	49.4	48.3	39.4	36.5	37.6	36.8	34.8	26.8	26.0	25.3	24.5
Coniferous logs [5]	185.8	169.6	166.0	193.8	188.5	176.6	193.5	196.8	208.8	212.5	216.5	214.8	233.7	230.6	227.0
Broadleaved logs [5]	40.7	38.7	37.9	36.7	34.8	33.4	35.7	38.7	39.8	41.7	41.7	39.7	38.1	41.3	40.0
Other industrial roundwood [5]	132.8	123.9	111.9	123.6	132.7	125.1	124.4	119.7	127.9	135.2	145.0	142.5	145.2	150.8	153.0
Sawn softwood [5]	90.4	80.4	80.8	89.1	80.9	79.6	82.5	87.8	91.0	93.1	91.6	89.1	96.5	95.3	93.5
Sawn hardwood [5]	19.9	14.8	15.1	16.7	15.8	15.1	15.8	17.0	18.4	18.9	19.4	18.9	18.4	21.4	20.4
Plywood [5]	6.7	6.7	7.6	8.8	8.9	9.7	10.6	11.9	13.1	14.5	14.8	14.9	16.5	15.6	15.2
Fibreboard	1.70	1.62	1.72	1.97	1.85	1.92	2.04	2.18	2.37	2.44	2.35	2.37	2.72	2.79	2.82
Mechanical wood pulp	9.20	8.98	8.79	9.45	9.67	9.60	9.86	10.12	10.78	11.13	11.76	11.49	11.95	11.67	11.50
Chemical wood pulp	20.62	20.25	20.19	22.50	23.69	25.03	26.46	28.53	31.11	32.93	35.97	36.20	37.70	41.47	42.00
Newsprint	7.32	7.41	7.04	7.51	7.89	7.96	7.96	8.05	8.66	8.98	9.86	9.79	9.99	10.82	10.60
Printing and writing paper	5.64	5.35	5.71	6.45	6.67	6.87	7.29	7.63	8.11	8.78	9.75	9.69	10.22	10.72	11.00
Other paper and paperboard	21.55	21.00	20.84	22.73	23.00	23.90	25.11	26.23	27.97	29.87	31.65	31.37	33.88	35.74	35.00

[1] Paddy converted at 65 percent. – [2] Olive oil, soybeans, groundnuts, cottonseed, sesame seed, sunflowerseed, rapeseed, linseed, castor beans. – [3] Beef and veal, mutton and lamb, pork, poultry meat. – [4] Nominal catch (liveweight). – [5] Million cubic metres.

ANNEX TABLE 4C. – NORTH AMERICA: INDICES OF FOOD AND TOTAL AGRICULTURAL PRODUCTION

	Total agricultural production							Food production						
	1964	1965	1966	1967	1968	1969	1970 (Preliminary)	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	1952-56 average = 100													
Total production														
NORTH AMERICA	117	119	120	124	126	125	124	120	122	127	132	133	132	130
Canada	119	131	144	123	135	135	123	119	131	145	124	135	134	119
United States	117	118	118	124	125	123	124	120	121	125	133	133	131	132
Per caput production														
NORTH AMERICA	99	99	99	101	101	99	98	101	102	104	107	107	105	103
Canada	94	102	110	92	99	98	88	95	102	110	93	99	97	85
United States	99	99	98	101	102	99	99	102	102	103	109	108	105	105

ANNEX TABLE 4D. – NORTH AMERICA: VOLUME OF IMPORTS OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Maize	0.24	0.28	0.38	0.34	0.41	0.61	0.92	0.61	0.55	0.49	0.54	0.76	0.81	0.69	0.55
Sugar (raw equivalent) [1,2]	4.46	4.43	5.01	4.86	4.93	4.55	4.98	4.84	4.06	4.34	4.64	5.16	5.41	5.28	6.01
Bananas	1.67	1.70	1.76	1.91	2.02	1.94	1.72	1.73	1.71	1.75	1.89	1.91	1.98	1.93	2.05
Citrus fruit [3]	0.21	0.21	0.20	0.24	0.22	0.20	0.20	0.22	0.25	0.23	0.23	0.24	0.26	0.26	0.26
Vegetable oils and oilseeds (oil equivalent) [4]	0.53	0.53	0.54	0.58	0.59	0.60	0.63	0.59	0.63	0.65	0.72	0.75	0.74	0.76	0.76
Cattle [5]	0.16	0.73	1.16	0.74	0.67	1.05	1.25	0.86	0.58	1.13	1.11	0.78	1.05	1.05	1.22
Meat (fresh. chilled and frozen) [6]	0.05	0.09	0.22	0.31	0.27	0.35	0.49	0.58	0.41	0.35	0.44	0.48	0.55	0.63	0.69
Coffee (green)	1.33	1.30	1.26	1.45	1.38	1.41	1.54	1.51	1.44	1.35	1.39	1.36	1.61	1.30	1.26
Cocoa beans	0.27	0.25	0.21	0.23	0.27	0.37	0.31	0.30	0.29	0.38	0.34	0.30	0.25	0.24	0.30
Wool (actual weight)	0.17	0.13	0.12	0.19	0.15	0.16	0.17	0.17	0.11	0.13	0.13	0.09	0.12	0.09	0.07
Rubber (natural)	0.64	0.61	0.52	0.63	0.45	0.43	0.47	0.42	0.50	0.50	0.49	0.51	0.60	0.62	0.62
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh. chilled or frozen fish	200.2	236.6	269.5	308.5	296.7	282.9	348.4	322.1	340.2	361.1	432.7	394.3	502.7	494.4	583.5
Dried. salted or smoked fish	41.8	40 5	51.9	41.9	41.5	39.8	37.7	36.5	36.0	35.8	38.4	32.8	33.2	30.3	38.2
Crustacea and molluscs. fresh. frozen. dried. salted. etc.	61.8	61.7	66.3	78.4	84.8	91.6	99.7	110.7	100.6	104.8	113.5	114.2	121.5	128.2	137.5
Fish products and preparations. whether or not in airtight containers	65.8	70.4	80.7	78.7	64.6	69.6	72.5	63.1	68.2	67.7	88.9	82.4	88.4	83.1	102.0
Crustacean and mollusc products and preparations. whether or not in airtight containers	7.8	9.9	11.8	14.4	13.3	13.1	14.3	15.5	22.3	23.2	21.5	24.9	26.2	26.3	27.2
Oils and fats. crude or refined. of aquatic animal origin	34.7	29.8	45.6	25.9	31.5	50.8	59.6	49.8	35.7	43.3	38.5	31.7	32.0	26.5	31.0
Meals. solubles. and similar animal feedstuffs of aquatic animal origin	84.6	83.2	105.4	146.1	124.5	210.2	234.7	350.6	406.9	250.3	410.1	595.3	779.9	325.8	228.2
	Million metric tons														
FOREST PRODUCTS															
Pulpwood [7]	4.42	4.18	3.31	3.05	3.42	3.43	3.39	3.08	1.85	1.83	1.98	1.86	1.65	1.64	1.55
Coniferous logs [7]	0.90	0.74	0.64	0.75	0.90	0.97	1.21	1.23	1.20	1.56	1.24	1.30	1.58	1.50	1.80
Broadleaved logs [7]	0.55	0.41	0.33	0.33	0.36	0.22	0.28	0.24	0.51	0.50	0.53	0.59	0.53	0.47	0.50
Sawn softwood [7]	7.84	6.79	7.87	9.32	8.97	9.86	11.15	12.11	11.73	11.73	11.39	11.69	13.98	14.06	13.60
Sawn hardwood [7]	0.92	0.81	0.83	1.09	0.94	0.83	0.97	0.97	1.00	1.08	1.26	1.20	1.09	1.36	1.00
Plywood [7]	0.46	0.46	0.55	0.90	0.66	0.73	0.96	1.07	1.31	1.42	1.64	1.66	2.29	2.53	2.20
Chemical wood pulp	1.93	1.76	1.78	2.06	1.98	2.01	2.34	2.28	2.42	2.60	2.80	2.64	2.99	3.43	3.20
Newsprint	5.05	4.74	4.43	4.77	4.91	4.96	4.97	4.91	5.40	5.74	6.34	5.99	5.86	6.16	5.86
Other paper and paperboard	0.28	0.24	0.26	0.29	0.26	0.29	0.30	0.28	0.31	0.33	0.42	0.41	0.43	0.48	0.60

[1] Including refined sugar converted at 108.7 percent. – [2] Excluding trade between United States and its territories. – [3] Oranges. mandarines and lemons. – [4] Groundnuts. copra. palm kernels. soybeans. sunflowerseed. linseed. castor beans. cottonseed. olive oil. groundnut oil. coconut oil. palm oil. palm-kernel oil. soy ean oil. sunflowerseed oil. linseed oil. castor oil. cottonseed oil. – [5] Million head. – [6] Beef and veal. mutton and lamb. pork. poultry meat. – [7] Million cubic metres.

ANNEX TABLE 4E. – NORTH AMERICA: VOLUME OF EXPORTS OF MAJOR AGRICULTRAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat and wheat flour (wheat equivalent)	21.98	20.27	19.18	19.64	23.30	29.84	24.98	31.11	37.45	31.63	39.44	28.70	27.42	20.64	30.28
Barley	3.56	2.55	4.25	3.83	3.01	2.40	2.59	1.62	2.48	2.11	2.04	2.02	1.03	0.80	4.15
Maize	3.02	4.52	4.57	5.59	5.61	7.35	10.81	11.12	12.14	15.21	15.60	12.97	15.00	14.02	13.86
Millet and sorghums	1.40	0.57	1.88	2.59	2.46	1.64	2.79	2.94	2.55	5.32	9.50	7.80	6.38	5.46	4.42
Rye	0.55	0.27	0.34	0.25	0.21	0.34	0.57	0.48	0.29	0.18	0.35	0.31	0.18	0.10	0.15
Rice (milled equivalent) [1]	0.82	0.74	0.57	0.69	0.89	0.80	1.05	1.20	1.33	1.47	1.28	1.72	1.71	1.66	1.58
Citrus fruit [2]	0.48	0.40	0.27	0.33	0.29	0.30	0.27	0.26	0.30	0.33	0.37	0.42	0.27	0.39	0.39
Pulses (dry)	0.16	0.17	0.18	0.31	0.24	0.16	0.26	0.34	0.28	0.30	0.32	0.28	0.27	0.35	0.41
Vegetable oils and oilseeds (oil equivalent) [3]	1.20	1.33	1.10	1.48	1.64	1.32	1.69	1.71	2.12	2.23	1.97	2.01	2.19	2.33	3.21
Oilseed cake and meal	0.83	0.61	0.44	0.93	0.83	0.79	1.37	1.69	1.95	2.47	2.60	2.75	2.91	3.24	3.97
Milk (condensed, evaporated and powdered)	0.27	0.24	0.22	0.25	0.21	0.23	0.22	0.35	0.47	0.31	0.19	0.15	0.17	0.21	0.27
Tobacco (unmanufactured)	0.25	0.24	0.23	0.23	0.24	0.24	0.23	0.25	0.26	0.23	0.27	0.28	0.29	0.29	0.25
Cotton (lint)	1.03	1.57	1.04	0.83	1.73	1.45	0.87	0.99	1.19	0.86	0.82	0.90	0.88	0.55	0.68
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh, chilled or frozen fish	142.0	148.7	148.2	139.6	147.3	141.9	157.3	159.1	197.5	216.4	240.0	224.9	252.1	234.4	221.7
Dried, salted or smoked fish	66.1	81.0	74.3	70.7	68.3	65.3	59.9	70.0	61.4	54.3	53.6	56.2	55.0	54.0	55.8
Crustacea and molluscs, fresh, frozen, dried, salted, etc.	14.5	15.0	13.9	14.4	16.4	19.0	18.9	22.8	24.5	25.6	23.7	24.2	26.9	34.0	36.1
Fish products and preparations, whether or not in airtight containers	48.9	40.4	49.4	46.0	30.0	24.2	26.4	31.2	42.8	36.0	37.1	42.4	34.6	36.5	31.4
Crustacean and mollusc products and preparations, whether or not in airtight containers	9.5	8.4	4.6	6.5	6.3	4.5	6.6	7.2	7.7	10.4	10.6	11.5	9.7	10.6	8.5
Oils and fats, crude or refined, of aquatic animal origin	76.0	57.3	52.0	82.7	80.9	61.2	61.7	129.8	87.4	58.7	41.1	46.7	37.6	96.4	94.8
Meals, solubles and similar animal feedstuffs of aquatic animal origin	54.0	48.6	29.7	46.3	34.0	38.8	46.2	54.3	60.4	57.5	51.7	50.7	65.3	73.0	77.4
	Million metric tons														
FOREST PRODUCTS															
Pulpwood [4]	4.89	4.51	3.29	2.91	3.12	3.17	3.20	2.88	3.14	3.44	3.52	3.07	2.64	2.66	2.90
Coniferous logs [4]	0.70	0.54	0.60	0.79	1.00	2.28	2.24	4.33	4.85	5.25	6.42	9.25	11.84	10.93	13.00
Broadleaved logs [4]	0.26	0.25	0.27	0.24	0.34	0.31	0.40	0.41	0.38	0.45	0.43	0.52	0.51	0.43	0.39
Sawn softwood [4]	10.81	10.22	10.76	11.38	12.55	13.28	14.50	16.68	17.36	17.43	16.51	17.25	19.16	18.27	19.50
Sawn hardwood [4]	0.61	0.57	0.53	0.64	0.62	0.55	0.60	0.59	0.69	0.74	0.91	0.81	0.66	0.75	0.70
Plywood and veneers [4]	0.16	0.13	0.13	0.22	0.19	0.21	0.29	0.31	0.45	0.47	0.52	0.62	0.67	0.72	0.70
Mechanical wood pulp	0.26	0.23	0.21	0.22	0.22	0.22	0.24	0.23	0.26	0.29	0.24	0.22	0.22	0.25	0.28
Chemical wood pulp	2.37	2.41	2.27	2.59	3.18	3.45	3.60	4.09	4.47	4.47	4.87	5.22	6.04	6.92	7.52
Newsprint	5.55	5.51	5.27	5.47	5.74	5.84	5.68	5.74	6.29	6.60	7.19	6.85	6.90	7.60	7.45
Other paper and paperboard	0.59	0.68	0.70	0.78	0.89	0.99	1.05	1.22	1.57	1.76	2.01	2.21	2.63	2.84	3.10

[1] Including paddy converted at 65 percent. – [2] Oranges, mandarines and lemons. – [3] Groundnuts, soybeans, sunflowerseed, linseed, cottonseed, groundnut oil, coconut oil, soybean oil, linseed oil, castor oil, cottonseed oil. – [4] Million cubic metres.

ANNEX TABLE 4F. – NORTH AMERICA: INDICES OF VOLUME AND VALUE OF EXPORTS AND IMPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS, BY COMMODITY GROUPS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	1957-59 average = 100														
Export volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	100	103	96	101	118	122	120	134	154	149	161	149	154	147	170
Agricultural products	100	104	95	101	121	124	120	135	158	149	162	144	144	128	158
Food and feed	102	96	96	108	117	128	134	152	179	175	191	164	164	149	190
Beverages and tobacco	104	104	99	98	103	104	100	106	109	99	114	118	125	122	108
Raw materials	90	137	90	74	143	121	74	83	102	76	76	79	78	53	63
Fishery products	101	97	104	99	92	91	96	115	125	121	118	125	125	141	136
Forest products	102	100	97	104	114	120	124	135	143	152	162	166	181	195	202
Sawnwood	101	95	99	105	115	120	130	148	155	156	151	155	169	162	172
Pulp and paper	101	101	96	103	114	119	119	126	139	143	157	156	169	192	197
Export value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	101	105	96	99	113	118	116	130	151	148	164	152	155	154	183
Agricultural products	102	107	96	97	115	123	119	135	159	153	170	151	146	133	170
Food and feed	103	98	97	105	111	126	133	152	182	180	202	174	165	152	203
Beverages and tobacco	94	102	99	99	108	111	108	115	120	110	137	144	153	158	143
Raw materials	101	145	90	65	131	117	73	78	94	69	65	66	67	45	55
Fishery products	94	93	102	105	99	93	97	114	135	142	151	159	161	193	204
Forest products	101	100	95	105	110	109	111	119	133	138	148	154	179	202	214
Sawnwood	107	97	96	108	113	107	115	132	141	144	143	145	181	197	200
Pulp and paper	97	101	95	104	109	107	106	110	124	127	140	142	156	181	195
Import volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	96	95	97	108	103	108	117	117	113	117	124	124	136	133	132
Agricultural products	95	95	97	108	101	106	115	113	104	107	112	113	124	115	117
Food and feed	82	90	105	105	103	109	121	121	105	110	123	130	139	141	147
Beverages and tobacco	100	98	95	107	106	112	117	115	112	111	112	110	123	104	105
Raw materials	110	101	87	112	88	89	95	91	84	90	86	83	92	88	81
Fishery products	82	88	101	111	107	114	121	132	136	135	158	160	186	168	186
Forest products	103	95	95	110	107	110	120	123	132	139	150	146	162	175	164
Sawnwood	98	86	97	117	111	117	133	143	139	141	141	143	164	170	158
Panels	73	74	86	139	103	112	147	167	202	219	245	247	345	385	329
Pulp and paper	108	100	95	105	106	108	113	112	122	130	143	136	139	153	147
Import value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	102	99	96	105	99	98	104	107	111	110	119	117	132	136	...
Agricultural products	102	101	97	102	95	93	97	102	101	98	104	103	114	112	...
Food and feed	80	89	104	106	101	105	115	129	110	110	127	136	150	159	...
Beverages and tobacco	113	109	97	94	88	86	86	84	101	93	92	89	100	85	...
Raw materials	121	109	79	112	99	84	88	86	85	82	81	68	69	76	...
Fishery products	85	90	100	110	108	120	142	144	174	168	203	199	236	244	278
Forest products	105	96	94	111	107	106	113	115	124	132	143	139	161	180	171
Sawnwood	108	86	94	121	109	110	116	123	123	131	134	132	190	213	190
Panels	77	79	85	136	104	102	136	151	172	176	199	192	270	302	260
Pulp and paper	106	100	95	105	106	106	110	109	121	128	142	136	140	157	156

ANNEX TABLE 4G. – NORTH AMERICA: ESTIMATED CALORIE AND PROTEIN CONTENT OF NATIONAL AVERAGE FOOD SUPPLY PER CAPUT

	Calories					Total protein					Animal protein				
	Pre-war	1948-1950	1963-1965	1966-1968	1969	Pre-war	1948-1950	1963-1965	1966-1968	1969	Pre-war	1948-1950	1963-1965	1966-1968	1969
	..... *Number per day*					..... *Grammes per day*									
Canada	[1] 3 020	[1] 3 110	3 120	3 200	3 150	[1] 84.6	[1] 93.1	94.6	95.8	96.8	[1] 47.9	[1] 57.2	62.1	64.0	66.1
United States	3 280	3 200	3 140	3 200	3 290	86.3	89.7	93.2	95.2	96.8	51.7	59.6	66.4	68.5	69.5

[1] Split years instead of calendar years.

ANNEX TABLE 5A. – OCEANIA: BASIC DATA ON NATIONAL AGRICULTURE

	Period	Population in agriculture		Agricultural GDP			Share of agriculture in value of total trade		Arable land per person in agriculture	Fertilizer consumption per hectare of arable land
							Exports	Imports		
		Thousands	*Percent of total*	*Million dollars*	*Percent of total*	*Dollars per caput*	..... *Percent*		*Hectares per caput*	*Kilogrammes per hectare*
Australia	1950	963	12	2 986	29	3 100	[1]92	[1]15	19.23	20
	1960	[2]1 133	11	1 962	13	1 732	80	13	26.24	21
	1965	1 117	10	2 334	12	2 090	81	10	33.26	29
	1968	1 136	9	2 260	8	1 989	64	9	39.21	26
New Zealand	1950	372	19	494	[3]24	1 328	...	...	2.62	156
	1960	336	14	739	[4]20	2 199	97	11	1.91	443
	1965	343	12	755	15	2 201	95	11	2.38	558
	1968	336	12	706	[5]15	2 101	88	10	2.33	534

[1] 1951. – [2] 1961. – [3] 1952. – [4] 1959. – [5] 1967.

ANNEX TABLE 5B. – OCEANIA: VOLUME OF PRODUCTION OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	..... *Million metric tons*														
AGRICULTURAL PRODUCTS															
Wheat	3.73	2.74	5.96	5.57	7.69	6.98	8.57	9.17	10.31	7.32	12.99	7.90	15.25	11.00	8.02
Sugar (centrifugal)	1.36	1.51	1.64	1.60	1.55	1.55	2.13	2.06	2.29	2.30	2.69	2.67	3.17	2.52	2.90
Wool (greasy)	0.93	0.88	0.97	1.02	1.00	1.04	1.04	1.09	1.09	1.07	1.12	1.13	1.22	1.26	1.23
Milk (total)	11.60	11.09	11.89	12.03	11.65	12.19	12.30	12.52	12.86	13.19	13.71	13.31	3.37	14.26	13.81
Meat [1]	2.01	2.04	2.25	2.22	2.13	2.32	2.51	2.58	2.64	2.57	2.53	2.70	2.86	3.06	3.10
FISHERY PRODUCTS [2]	0.10	0.11	0.11	0.12	0.11	0.11	0.11	0.11	0.12	0.13	0.14	0.15	0.16	0.14	0.15
FOREST PRODUCTS															
Fuelwood [3]	8.0	7.9	7.9	7.8	7.7	7.6	7.5	7.4	7.3	7.3	7.2	7.0	6.9	7.0	7.0
Coniferous logs [3]	4.1	4.2	4.7	4.9	5.5	5.4	5.1	5.3	6.0	6.2	6.3	6.5	7.1	7.7	7.6
Broadleaved logs [3]	7.4	7.3	7.0	7.2	7.6	7.6	7.0	7.4	7.8	7.8	8.0	8.0	8.2	7.9	7.6
Other industrial roundwood [3]	2.7	2.3	2.6	2.6	2.7	2.9	2.9	3.3	3.5	3.6	3.8	3.6	3.6	4.3	4.5
Sawn softwood [3]	2.1	2.1	2.1	2.3	2.3	2.2	2.1	2.2	2.5	2.5	2.5	2.3	2.4	2.5	2.5
Sawn hardwood [3]	2.5	2.4	2.6	2.7	2.7	2.6	2.4	2.5	2.6	2.8	2.7	2.6	2.8	2.7	2.7
Mechanical wood pulp	0.24	0.26	0.28	0.30	0.30	0.30	0.31	0.38	0.42	0.46	0.43	0.44	0.46	0.51	0.53
Chemical wood pulp	0.26	0.26	0.26	0.30	0.28	0.31	0.33	0.38	0.42	0.45	0.49	0.54	0.56	0.73	0.80
Newsprint	0.13	0.15	0.16	0.17	0.18	0.18	0.21	0.26	0.28	0.29	0.28	0.30	0.30	0.33	0.37
Other paper and paperboard	0.35	0.37	0.41	0.44	0.52	0.54	0.55	0.64	0.69	0.81	0.85	0.91	0.92	1.02	1.16

[1] Beef and veal, mutton and lamb, pork, poultry meat. – [2] Nominal catch (liveweight). – [3] Million cubic metres.

ANNEX TABLE 5C. – OCEANIA: INDICES OF FOOD AND TOTAL AGRICULTURAL PRODUCTION

	Total agricultural production							Food production						
	1964	1965	1966	1967	1968	1969	1970 (Preliminary)	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	1952-56 average = 100													
Total production														
OCEANIA	141	135	152	143	167	164	162	144	136	159	145	175	167	166
Australia	144	133	154	141	171	166	164	149	137	167	145	185	171	171
New Zealand	135	142	145	151	157	160	158	133	134	139	145	153	160	156
Per caput production														
OCEANIA	113	106	117	108	123	119	115	115	107	122	109	130	121	118
Australia	116	105	120	108	128	121	118	120	109	130	111	139	126	123
New Zealand	109	113	113	116	119	120	117	108	107	108	111	117	120	116

ANNEX TABLE 5D. – OCEANIA: VOLUME OF IMPORTS OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat and wheat flour (wheat equivalent)	0.32	0.34	0.32	0.27	0.22	0.23	0.26	0.26	0.27	0.24	0.19	0.15	0.11	0.09	0.11
Sugar (raw equivalent) [1]	0.11	0.11	0.15	0.12	0.13	0.16	0.14	0.15	0.13	0.16	0.16	0.17	0.18	0.20	0.23
Rubber (natural)	0.05	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.04	0.06	0.05	0.05	0.06	0.06	0.06
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh, chilled or frozen fish	9.1	9.3	10.7	11.3	16.3	15.8	14.4	5.1	19.1	21.0	28.0	27.0	27.0	33.0	35.0
Dried, salted or smoked fish	4.0	2.3	5.5	3.6	4.3	4.0	5.0	5.0	4.9	4.0	5.0	3.0	4.0	5.0	4.0
Fish products and preparations, whether or not in airtight containers	18.2	14.7	14.3	14.2	18.0	24.7	19.1	18.8	27.4	24.5	25.1	27.0	27.0	27.0	27.0
Oils and fats, crude or refined, of aquatic animal origin	1.3	2.4	2.3	2.3	2.7	3.5	3.3	2.9	3.9	7.3	8.0	4.0	5.0	7.0	5.0
Meals, solubles and similar animal feedstuffs of aquatic animal origin	0.1	0.5	1.5	4.0	6.0	9.4	6.2	5.7	8.5	11.0	11.0	14.0	28.0	30.0	27.0
	Million metric tons														
FOREST PRODUCTS															
Sawn softwood [2]	0.66	0.65	0.60	0.56	0.70	0.71	0.60	0.58	0.73	0.72	0.72	0.70	0.69	0.77	0.77
Newsprint	0.23	0.21	0.31	0.22	0.25	0.30	0.20	0.22	0.26	0.29	0.28	0.28	0.30	0.30	0.30
Other paper and paperboard	0.14	0.11	0.12	0.12	0.15	0.20	0.15	0.17	0.17	0.19	0.17	0.19	0.20	0.22	0.25

[1] Including refined sugar converted at 108.7 percent. – [2] Million cubic metres.

ANNEX TABLE 5E. – OCEANIA: VOLUME OF EXPORTS OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat and wheat flour (wheat equivalent)	3.57	2.56	1.42	2.68	3.60	6.41	4.79	6.44	6.82	7.25	4.79	8.69	5.39	6.57	8.27
Barley	0.63	0.64	0.32	0.88	0.38	0.95	0.40	0.28	0.36	0.38	0.25	0.43	0.12	0.55	0.74
Oats	0.20	0.09	0.07	0.38	0.22	0.39	0.27	0.31	0.37	0.31	0.25	0.42	0.17	0.35	0.25
Sugar (raw equivalent) [1]	0.82	0.98	0.89	0.84	1.04	0.99	1.40	1.45	1.60	1.47	1.66	2.03	2.49	1.78	1.90
Copra and coconut oil (oil equivalent)	0.17	0.18	0.16	0.17	0.17	0.18	0.17	0.18	0.18	0.17	0.18	0.17	0.15	0.17	0.17
Beef and veal	0.24	0.28	0.28	0.32	0.25	0.26	0.37	0.40	0.43	0.40	0.39	0.35	0.38	0.46	0.53
Mutton and lamb	0.31	0.30	0.34	0.39	0.42	0.41	0.41	0.43	0.48	0.44	0.47	0.51	0.55	0.62	0.61
Butter	0.25	0.21	0.24	0.28	0.22	0.25	0.24	0.27	0.28	0.27	0.28	0.32	0.27	0.29	0.22
Cheese	0.11	0.10	0.10	0.10	0.10	0.11	0.12	0.12	0.13	0.12	0.12	0.14	0.12	0.13	0.11
Wool (actual weight)	0.72	0.80	0.73	0.87	0.85	0.89	0.89	0.91	0.89	0.90	0.92	0.86	0.97	1.00	1.04
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh, chilled or frozen fish	3.0	4.0	3.0	4.0	4.0	3.0	3.0	3.0	4.0	8.0	12.0	12.0	13.0	16.0	17.0
Crustacea and molluscs, fresh, frozen, dried, salted, etc.	4.0	4.0	4.0	4.0	5.0	5.0	6.0	6.0	7.0	8.0	8.0	10.0	13.0	13.0	15.2
Oils and fats, crude or refined, of aquatic animal origin	14.0	16.0	19.0	15.0	17.0	11.0	8.0	4.0	5.3	9.0	6.0	4.0	6.5	6.0	4.0
	Million cubic metres														
FOREST PRODUCTS															
Coniferous logs	—	—	0.04	0.15	0.14	0.27	0.29	0.29	0.36	0.45	0.55	0.80	1.44	1.68	1.80

[1] Including refined sugar converted at 108.7 percent.

ANNEX TABLE 5F. – OCEANIA: INDICES OF VOLUME AND VALUE OF EXPORTS AND IMPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS, BY COMMODITY GROUPS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	1957-59 average = 100														
Export volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	96	98	92	109	107	120	120	128	133	132	128	141	140	150	158
Agricultural products	96	98	92	110	106	120	120	128	132	131	127	139	138	147	154
Food and feed	102	97	93	111	106	128	128	142	153	149	138	171	152	165	176
Beverages and tobacco	82	92	94	113	131	158	194	231	270	303	299	349	426	464	456
Raw materials	90	100	92	109	107	112	112	114	111	114	115	108	122	127	132
Fishery products	92	101	100	98	117	103	113	108	128	171	198	241	292	309	343
Forest products	57	86	98	116	116	118	119	170	189	193	206	225	315	338	356
Export value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	99	110	85	105	103	112	112	133	147	135	133	140	125	146	154
Agricultural products	99	110	85	105	102	112	112	133	147	134	132	138	121	141	150
Food and feed	101	94	89	117	108	126	126	152	170	164	154	185	153	180	201
Beverages and tobacco	73	80	103	117	120	128	159	188	213	232	226	306	390	456	518
Raw materials	98	126	81	93	97	99	99	115	124	104	110	93	90	103	100
Fishery products	89	103	96	100	110	106	141	134	149	203	258	277	384	421	437
Forest products	58	87	98	115	119	121	118	157	176	184	195	221	317	372	394
Import volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	96	97	104	99	107	116	98	108	118	128	127	123	129	133	142
Agricultural products	93	98	102	100	101	104	95	105	110	120	117	110	113	117	127
Food and feed	91	96	107	97	95	105	106	114	120	127	131	124	129	126	145
Beverages and tobacco	91	100	98	102	104	107	94	99	105	109	113	104	105	112	121
Raw materials	101	98	101	102	105	98	82	100	106	127	102	98	103	112	111
Fishery products	109	94	104	102	133	164	134	110	186	184	218	215	227	248	254
Forest products	99	95	109	96	115	135	97	114	124	136	134	136	147	150	156
Import value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	97	98	103	98	105	110	92	105	119	126	124	119	122	132	...
Agricultural products	97	101	99	100	100	97	88	101	111	114	111	102	102	111	...
Food and feed	93	99	105	96	91	101	101	124	136	138	142	130	136	140	...
Beverages and tobacco	91	100	98	103	96	93	83	87	94	94	97	92	90	99	...
Raw materials	111	105	95	101	118	100	78	95	103	115	88	76	74	93	...
Fishery products	109	90	109	101	133	166	135	118	188	209	256	254	252	281	298
Forest products	97	94	111	94	112	129	93	111	124	138	131	133	142	150	163

ANNEX TABLE 5G. – OCEANIA: ESTIMATED CALORIE AND PROTEIN CONTENT OF NATIONAL AVERAGE FOOD SUPPLY PER CAPUT

	Calories					Total protein					Animal protein				
	Pre-war	1948/-1950/	1963/-1965/	1966/-1968/	1968/1969	Pre-war	1948/-1950/	1963/-1965/	1966/-1968/	1968/1969	Pre-war	1948/-1950/	1963/-1965/	1966/-1968/	1968/1969
	Number per day					*Grammes per day*									
Australia	3 300	3 240	3 160	3 110	3 220	103.3	97.5	91.5	98.6	106.4	66.6	66.1	61.3	65.3	68.9
New Zealand [1]	3 260	3 360	3 470	3 380	[2]3 320	100.7	100.1	110.8	108.4	[2]106.4	67.8	66.8	75.9	73.9	[2]72.8

[1] Calendar years instead of split years. – [2] 1969.

ANNEX TABLE 6A. – LATIN AMERICA: BASIC DATA ON NATIONAL AGRICULTURE

	Period	Population in agriculture		Agricultural GDP			Share of agriculture in value of total trade		Arable land per person in agriculture	Fertilizer consumption per hectare of arable land
							Exports	Imports		
		Thousands	*Percent of total*	*Million dollars*	*Percent of total*	*Dollars per caput*	..... *Percent*		*Hectares per caput*	*Kilogrammes per hectare*
Argentina	1950	[1]3 682	20	1 477	14	401	...	...	8.15	1
	1960	3 933	19	2 427	17	617	95	10	4.95	1
	1965	4 510	20	2 884	17	639	94	17	6.44	1
	1968	4 516	19	2 172	14	481	86	16	7.23	2
Barbados	1960	48	24	20	28	408	85	35	0.54	271
	1965	60	25	23	26	388	74	34	...	...
	1967	...	...	27	26	...	72	31	...	[2]231
Bolivia	1950	1 890	63	...	33	...	...	...	1.64	—
	1960	...	...	122	29	...	...	...	...	—
	1965	2 731	63	124	23	45	4	22	...	...
	1968	2 794	60	146	19	52	...	...	1.11	0.3
Brazil	1950	31 720	61	2 378	29	75	[3]94	[3]17	0.63	2
	1960	36 244	52	4 106	28	113	88	17	0.82	8
	1965	40 383	50	3 682	22	91	83	21	...	...
	1966	42 185	[2]48	3 935	19	93	85	19	0.71	[2]18
Chile	1950	[1]1 830	30	312	14	171	...	...	2.08	6
	1960	2 156	28	382	12	177	...	...	2.56	17
	1965	2 349	28	404	10	172	6	25	1.92	24
	1967	2 445	26	450	[3]9	184	7	22	1.85	[2]30
Colombia	1950	[4]6 185	53	943	39	152	...	...	0.39	5
	1960	6 554	46	1 327	35	202	70	12	0.77	11
	1965	9 010	50	1 511	32	168	75	14	...	...
	1968	9 361	47	2 074	31	222	78	11	0.43	36
Costa Rica	1950	...	...	101	43	...	...	...	...	31
	1960	[5]675	51	115	27	170	96	14	[5]0.92	26
	1965	745	50	146	27	196	85	10	...	...
	1968	737	44	166	24	225	81	14	0.86	79
Dominican Republic	1950	985	46	119	27	121	...	...	0.69	3
	1960	1 830	61	207	27	113	91	10	0.58	10
	1965	2 148	59	209	26	97	87	32	...	...
	1968	2 299	57	231	22	100	88	22	0.46	16
Ecuador	1950	1 696	53	186	39	110	...	...	1.77	—
	1960	2 704	52	288	37	106	96	11	...	6
	1965	2 955	57	324	34	110	97	13	0.98	5
	1968	3 167	56	390	32	123	99	10	1.21	19
El Salvador	1950	1 197	63	...	...	...	...	...	0.45	2
	1960	[6]1 500	60	164	32	110	94	18	[6]0.43	32
	1965	1 670	57	219	30	131	81	18	...	...
	1968	1 682	52	231	27	137	...	...	0.39	89
Guatemala	1950	1 727	62	231	33	134	...	...	0.85	1
	1960	...	...	305	30	...	...	...	...	10
	1965	2 842	64	380	29	134	86	12	...	...
	1968	3 104	63	390	27	125	75	13	0.48	28
Honduras	1950	1 162	83	145	56	125	..	...	0.70	1
	1960	1 273	67	161	44	126	93	13	0.78	6
	1965	1 405	65	198	42	141	81	12	...	...
	1968	1 510	63	222	38	147	84	13	0.54	22
Jamaica	1950	650	46	61	31	94	...	...	0.26	26
	1960	[7]755	46	73	12	96	44	25	0.40	50
	1965	788	44	100	12	127	41	27	0.39	67
	1968	812	42	89	10	110	37	23	0.30	129

ANNEX TABLE 6A. – LATIN AMERICA: BASIC DATA ON NATIONAL AGRICULTURE (*concluded*)

	Period	Population in agriculture		Agricultural GDP			Share of agriculture in value of total trade		Arable land per person in agriculture	Fertilizer consumption per hectare of arable land
							Exports	Imports		
		Thousands	*Percent of total*	*Million dollars*	*Percent of total*	*Dollars per caput*	..... *Percent*		*Hectares per caput*	*Kilogrammes per hectare*
Mexico	1950	15 254	58	1 724	23	113	...	...	1.31	1
	1960	19 440	54	2 578	19	133	...	...	1.23	8
	1965	22 200	52	3 092	17	139	57	9	...	...
	1968	23 731	50	3 401	13	143	54	8	1.00	22
Nicaragua	1950	748	68	[8]84	[8]42	112	...	...	0.91	1
	1960	...	...	124	37	...	94	9	...	2
	1965	960	58	191	37	199	90	11	...	...
	1968	1 062	56	197	30	185	87	12	0.82	36
Panama	1950	393	49	64	27	162	...	...	0.63	8
	1960	507	48	96	25	189	94	15	1.11	9
	1965	540	43	143	24	265	56	12	...	...
	1968	566	41	192	24	339	77	10	1.00	23
Paraguay	1950	784	56	104	42	132	...	...	...	...
	1960	990	52	116	36	117	...	...	1.96	...
	1965	1 018	50	144	36	142	...	...	0.91	2
	1968	1 124	50	153	32	136	...	...	0.84	3
Peru	1950	...	...	513	35	...	...	...	...	42
	1960	5 000	50	646	25	129	...	...	0.39	42
	1965	5 775	50	697	20	121	55	18	0.47	31
	1968	6 159	48	583	17	95	...	...	0.42	26
Trinidad and Tobago	1950	133	20	30	17	227	[4]19	[4]21	1.29	19
	1960	160	20	51	12	322	13	18	1.09	35
	1965	197	20	62	11	316	9	13	...	...
	1968	199	19	61	8	307	9	12	0.70	70
Uruguay	1950	[4]454	19	...	18	...	...	...	3.40	1
	1960	[6]390	14	267	19	570	...	...	5.77	8
	1965	470	17	221	15	470	...	...	4.20	21
	1968	466	17	230	14	494	...	...	4.20	21
Venezuela	1950	1 986	40	...	...	...	...	...	1.36	1
	1960	[6]2 337	31	388	7	166	1	19	2.23	2
	1965	2 705	29	566	8	209	1	16	...	...
	1968	2 884	28	757	8	262	1	14	1.81	10

[1] 1952. – [2] 1968. – [3] 1966. – [4] 1951. – [5] 1963. – [6] 1961. – [7] 1960/61. – [8] 1953.

ANNEX TABLE 6B. – LATIN AMERICA: VOLUME OF PRODUCTION OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat	11.25	9.82	10.63	9.46	8.01	9.55	9.77	12.81	15.64	10.40	10.59	11.79	10.49	12.80	10.48
Maize	19.00	18.72	21.52	22.28	22.43	24.33	25.62	26.25	28.15	30.87	32.53	35.19	33.57	33.20	39.18
Rice (milled equivalent)[1]	3.69	4.15	4.03	4.25	4.92	5.27	5.51	5.52	6.02	7.02	5.89	6.69	6.74	6.58	7.55
Sugar (centrifugal)	13.42	15.00	16.15	16.49	17.20	18.04	15.92	15.58	16.78	19.95	17.84	19.93	18.73	18.75	23.56
Citrus fruit	4.14	4.42	4.49	4.63	4.76	5.00	5.33	5.65	5.68	5.84	6.35	6.45	6.92	7.52	7.95
Bananas	9.12	10.16	10.14	10.92	11.49	11.43	11.67	12.22	13.69	14.48	14.21	15.40	15.76	16.59	17.34
Groundnuts	0.57	0.67	0.78	0.79	0.82	1.04	1.29	1.11	1.03	1.38	1.52	1.31	1.23	1.17	1.35
Cottonseed	2.02	1.93	2.29	1.90	2.22	2.46	2.84	2.93	2.96	2.98	2.96	2.68	3.06	3.02	2.94
Sunflowerseed	0.87	0.74	0.94	0.49	0.92	0.68	0.97	0.59	0.57	0.84	0.94	1.23	1.03	0.97	1.23
Copra	0.22	0.23	0.23	0.23	0.24	0.27	0.27	0.24	0.24	0.24	0.24	0.24	0.25	0.24	0.24
Palm kernels	0.11	0.12	0.13	0.12	0.14	0.16	0.18	0.19	0.20	0.22	0.22	0.22	0.22	0.24	0.23
Total vegetable oils and oilseeds (oil equivalent)[2]	1.40	1.44	1.60	1.51	1.64	1.83	2.13	1.95	2.01	2.19	2.27	2.20	2.23	2.43	2.58
Coffee	1.87	2.43	2.18	3.36	3.25	3.68	3.08	2.77	1.87	3.62	2.50	2.88	2.40	2.69	2.31
Cocoa	0.30	0.31	0.32	0.33	0.33	0.33	0.31	0.31	0.33	0.33	0.33	0.37	0.35	0.38	0.41
Tobacco	0.38	0.40	0.38	0.40	0.43	0.44	0.48	0.52	0.50	0.53	0.50	0.54	0.54	0.55	0.59
Cotton (lint)	1.15	1.11	1.25	1.07	1.24	1.37	1.59	1.64	1.68	1.61	1.67	1.51	1.71	1.67	1.61
Sisal	0.27	0.28	0.29	0.34	0.35	0.37	0.38	0.40	0.43	0.42	0.42	0.39	0.38	0.37	0.39
Wool (greasy)	0.34	0.34	0.34	0.35	0.35	0.34	0.33	0.34	0.35	0.35	0.37	0.36	0.34	0.34	0.34
Milk (total)	17.50	17.69	17.52	17.69	18.22	18.38	18.73	19.35	20.48	20.99	21.92	21.93	22.94	23.69	23.54
Meat[3]	7.46	7.61	7.90	7.27	6.80	7.73	8.11	8.43	8.03	8.29	8.68	9.05	9.51	10.09	10.35
Eggs	0.72	0.80	0.83	0.82	0.86	0.91	0.91	0.93	0.99	1.09	1.17	1.16	1.22	1.29	1.34
FISHERY PRODUCTS[4]	1.11	1.36	1.87	3.23	4.90	6.78	8.75	8.90	11.67	9.64	11.65	12.82	13.64	11.92	15.47
FOREST PRODUCTS															
Sawn softwood[5]	5.1	4.6	5.3	5.2	4.9	5.1	5.3	5.0	5.6	5.8	6.3	6.5	6.8	6.7	7.0
Sawn hardwood[5]	7.5	6.7	6.6	6.2	6.3	6.3	6.6	6.4	6.8	6.8	7.1	7.3	7.4	7.5	7.8
Plywood[5]	0.23	0.24	0.31	0.29	0.28	0.33	0.37	0.37	0.38	0.39	0.40	0.48	0.55	0.60	0.62
Mechanical wood pulp	0.16	0.16	0.20	0.22	0.24	0.28	0.27	0.34	0.35	0.38	0.40	0.41	0.42	0.43	0.44
Chemical wood pulp	0.19	0.22	0.23	0.27	0.35	0.47	0.51	0.65	0.71	0.79	0.89	0.94	1.02	1.10	1.18
All paper and paperboard	1.18	1.23	1.39	1.49	1.56	1.80	1.90	1.98	2.21	2.43	2.67	2.74	2.93	3.18	3.50

[1] Paddy converted at 65 percent. – [2] Olive oil, palm oil, soybeans, groundnuts, cottonseed, sesame seed, sunflowerseed, rapeseed, copra, palm kernels, linseed, hempseed, castor beans. – [3] Beef and veal, mutton and lamb, pork, poultry meat. – [4] Nominal catch (liveweight). – [5] Million cubic metres.

ANNEX TABLE 6C. – LATIN AMERICA: INDICES OF FOOD AND TOTAL AGRICULTURAL PRODUCTION

	Total agricultural production							Food production						
	1964	1965	1966	1967	1968	1969	1970 (Preliminary)	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	1952-56 average = 100													
Total production														
LATIN AMERICA	134	143	140	148	147	153	158	137	141	142	151	152	157	166
Central America	173	178	182	188	194	196	201	169	177	184	191	200	209	217
Costa Rica	148	169	166	183	193	213	231	143	158	146	161	179	193	213
El Salvador	179	157	162	172	171	190	190	134	145	159	163	176	179	194
Guatemala	193	201	187	203	201	196	196	164	155	161	166	172	180	183
Honduras	149	167	162	170	192	177	178	142	154	149	163	184	171	176
Nicaragua	219	206	213	214	214	195	209	158	160	165	179	192	191	205
Mexico	170	176	181	186	190	191	195	174	184	190	197	200	211	218
Panama	149	159	162	169	197	205	202	150	160	162	170	199	207	205
Caribbean	106	116	106	120	111	108	137	106	117	107	121	112	109	140
Barbados	100	118	106	121	100	90	98	100	118	106	121	100	90	98
Cuba	95	115	97	122	111	104	154	94	117	96	123	111	104	156
Dominican Republic	132	116	125	130	125	138	149	130	116	125	132	126	140	153
Haiti	106	108	105	102	103	103	106	110	112	113	112	110	112	114
Jamaica	135	142	145	134	129	121	118	138	145	147	135	130	122	119
South America	132	142	140	147	146	154	158	138	140	144	152	152	159	166
Argentina	124	113	121	128	120	130	129	126	113	123	133	124	134	131
Bolivia	193	187	190	198	198	200	203	202	194	197	204	202	203	206
Brazil	136	171	154	163	165	176	179	153	169	165	174	181	187	201
Chile	123	121	134	132	137	129	134	123	121	135	131	138	130	135
Colombia	130	134	137	143	151	154	156	128	132	136	141	149	152	154
Ecuador	194	211	209	216	214	220	231	199	211	207	217	219	219	226
Guyana	138	153	143	149	147	154	144	137	152	141	147	146	153	142
Paraguay	127	136	133	140	141	146	148	126	133	136	142	140	144	149
Peru	136	138	146	147	142	150	156	133	137	148	153	145	156	165
Uruguay	107	105	96	87	100	104	106	114	113	99	87	106	112	117
Venezuela	173	183	191	207	214	223	232	180	192	200	218	226	235	247
Per caput production														
LATIN AMERICA	101	105	100	103	99	100	101	103	104	102	105	102	103	105
Central America	125	124	123	123	123	120	119	122	124	125	125	126	128	129
Costa Rica	102	112	106	112	114	121	127	98	104	93	98	106	110	117
El Salvador	136	115	116	119	114	123	119	102	107	114	113	117	116	121
Guatemala	144	145	131	138	134	126	123	122	112	113	113	114	116	114
Honduras	109	118	111	112	123	109	106	104	109	102	108	117	106	105
Nicaragua	163	149	150	146	142	125	129	117	115	116	122	127	123	126
Mexico	122	122	122	121	119	116	116	125	127	128	128	126	128	127
Panama	111	114	112	114	128	129	123	111	115	113	114	130	130	125
Caribbean	85	91	81	90	82	78	97	85	92	82	91	83	78	99
Barbados	93	108	96	108	89	79	85	93	108	96	108	89	79	85
Cuba	77	91	75	93	82	76	110	76	92	74	93	83	76	112
Dominican Republic	93	79	82	82	76	81	85	91	78	82	83	77	82	87
Haiti	88	88	84	80	79	77	78	92	91	91	88	85	84	84
Jamaica	114	117	116	105	99	91	87	117	119	117	106	100	92	88
South America	100	105	100	103	100	102	102	105	104	103	106	104	105	107
Argentina	104	93	98	102	95	101	98	105	93	99	106	98	104	100
Bolivia	151	143	141	143	139	137	136	158	148	146	147	142	140	138
Brazil	101	124	108	112	110	113	112	114	122	116	119	120	121	126
Chile	96	92	100	95	97	90	91	96	92	100	95	98	90	91
Colombia	95	95	94	95	97	96	95	94	93	93	94	96	95	93
Ecuador	142	149	143	143	137	136	138	145	149	141	144	140	136	135
Guyana	103	110	100	101	97	98	89	102	110	99	100	96	97	88
Paraguay	99	103	97	99	97	97	95	98	100	99	101	96	96	96
Peru	104	102	105	102	96	98	99	101	102	106	106	98	102	105
Uruguay	93	90	82	72	83	85	86	99	97	83	73	87	92	94
Venezuela	118	122	122	128	128	128	129	124	128	128	135	135	136	138

ANNEX TABLE 6D. – LATIN AMERICA: VOLUME OF IMPORTS OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat and wheat flour (wheat equivalent)	3.31	3.25	3.40	3.95	4.20	4.24	4.88	5.16	5.99	5.57	6.70	6.86	7.04	6.56	6.19
Maize	0.20	0.86	0.96	0.16	0.21	0.22	0.39	0.67	0.67	0.40	0.41	0.37	0.59	0.66	0.65
Rice (milled equivalent) [1]	0.22	0.32	0.40	0.34	0.35	0.35	0.31	0.34	0.50	0.55	0.45	0.37	0.36	0.35	0.35
Sugar (raw equivalent) [2]	0.28	0.49	0.37	0.39	0.24	0.50	0.23	0.27	0.21	0.27	0.31	0.25	0.24	0.27	...
Bananas	0.14	0.21	0.27	0.25	0.27	0.27	0.24	0.24	0.24	0.25	0.26	0.23	0.24	0.28	...
Pulses (dry)	0.13	0.13	0.17	0.17	0.14	0.17	0.13	0.16	0.19	0.16	0.19	0.21	0.21	0.18	...
Cattle [3]	0.20	0.26	0.24	0.21	0.30	0.35	0.39	0.42	0.29	0.27	0.32	0.33	0.29	0.31	...
Sheep, lambs and goats [3]	0.14	0.04	0.05	0.05	0.08	0.09	0.11	0.28	0.14	0.07	0.09	0.11	0.15	0.11	...
Milk (condensed, evaporated and powdered)	0.14	0.15	0.15	0.17	0.14	0.18	0.20	0.23	0.24	0.24	0.23	0.26	0.26	0.26	...
Rubber (natural)	0.07	0.09	0.10	0.08	0.09	0.09	0.08	0.08	0.09	0.08	0.09	0.08	0.10	0.10	...
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh, chilled or frozen fish	0.4	0.5	0.7	0.5	2.7	2.3	3.1	16.4	16.4	20.0	16.3	22.7	28.3	29.6	13.5
Dried, salted or smoked fish	84.5	82.5	61.0	63.4	67.9	65.5	68.5	78.2	81.1	59.6	81.6	90.2	90.8	94.7	96.8
Crustacea and molluscs, fresh, frozen, dried, salted, etc.	0.3	0.5	0.5	0.6	0.5	0.5	0.8	0.9	1.0	1.4	3.5	4.8	6.5	5.8	7.5
Fish products and preparations, whether or not in airtight containers	17.7	20.2	18.4	21.3	20.3	16.3	21.8	20.7	25.9	22.8	28.1	24.6	22.6	25.9	26.0
Oils and fats, crude or refined, of aquatic animal origin	2.0	3.6	1.9	3.0	4.0	10.3	2.3	7.5	13.5	18.3	32.5	19.7	37.3	41.5	43.0
Meals, solubles and similar animal feedstuffs of aquatic animal origin	3.2	4.9	6.4	15.0	32.1	31.0	48.5	53.8	72.7	77.1	91.9	104.7	137.1	137.2	138.8
	Million metric tons														
FOREST PRODUCTS															
Broadleaved logs [4]	0.41	0.32	0.34	0.24	0.27	0.28	0.23	0.22	0.25	0.37	0.35	0.31	0.23	0.23	0.25
Sawn softwood [4]	1.10	1.62	1.42	1.08	1.05	1.32	1.09	1.03	1.23	1.39	1.49	1.34	1.63	1.63	1.65
Chemical wood pulp	0.43	0.45	0.40	0.44	0.40	0.49	0.38	0.41	0.50	0.50	0.54	0.49	0.61	0.59	0.61
Newsprint	0.48	0.55	0.54	0.52	0.60	0.64	0.58	0.54	0.56	0.60	0.66	0.67	0.76	0.79	0.82
Other paper and paperboard	0.35	0.36	0.36	0.31	0.30	0.31	0.28	0.29	0.41	0.43	0.58	0.63	0.70	0.72	0.75

[1] Including paddy converted at 65 percent. – [2] Including refined sugar converted at 108.7 percent. – [3] Million head. – [4] Million cubic metres.

ANNEX TABLE 6E. – LATIN AMERICA: VOLUME OF EXPORTS OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat and wheat flour (wheat equivalent)	3.03	2.83	2.45	2.48	2.50	1.10	2.87	1.97	4.31	7.44	5.26	2.37	2.44	2.79	2.56
Maize	1.11	0.84	1.74	2.74	3.11	1.79	3.00	3.18	3.75	4.79	5.29	6.05	5.08	5.50	6.90
Millet and sorghums	0.17	0.16	0.34	0.33	0.20	0.39	0.67	0.64	0.89	0.34	1.18	1.16	0.88	1.53	2.25
Rye	0.16	0.31	0.19	0.06	0.14	0.04	0.01	—	0.11	0.10	—	—	0.02	0.02	0.04
Rice (milled equivalent) [1]	0.24	0.12	0.16	0.12	0.13	0.34	0.31	0.18	0.15	0.44	0.60	0.32	0.47	0.36	0.32
Sugar (raw equivalent) [2,3]	7.90	8.64	8.83	8.17	10.01	10.92	8.94	7.69	7.64	9.27	8.60	10.14	9.52	9.34	11.52
Bananas	2.37	2.63	2.79	2.94	3.11	3.10	3.02	3.15	3.18	3.37	3.94	4.17	4.63	4.70	4.80
Vegetable oils and oilseeds (oil equivalent) [4]	0.15	0.31	0.39	0.34	0.37	0.49	0.57	0.51	0.42	0.61	0.50	0.60	0.43	0.54	0.65
Oilseed cake and meal	0.79	0.82	1.39	1.07	1.00	1.27	1.46	1.42	1.28	1.66	1.74	1.62	1.55	1.72	2.30
Cattle	0.35	0.61	0.71	0.61	0.66	0.85	1.13	0.95	0.61	0.79	0.84	0.82	0.95	1.00	1.00
Beef and veal	0.40	0.42	0.46	0.42	0.37	0.37	0.44	0.67	0.62	0.51	0.54	0.52	0.48	0.59	0.61
Coffee (green)	1.70	1.57	1.56	1.87	1.85	1.83	1.92	2.06	1.82	1.69	1.90	1.93	2.11	2.09	1.92
Cocoa beans	0.21	0.20	0.19	0.17	0.23	0.19	0.15	0.18	0.16	0.19	0.21	0.22	0.20	0.21	0.23
Tobacco (unmanufactured)	0.08	0.08	0.08	0.08	0.09	0.12	0.13	0.13	0.15	0.13	0.11	0.12	0.11	0.14	0.13
Wool (actual weight)	0.19	0.13	0.18	0.20	0.19	0.23	0.21	0.19	0.14	0.20	0.21	0.18	0.22	0.18	0.18
Cotton (lint)	0.76	0.52	0.59	0.73	0.61	0.76	1.01	0.98	0.91	1.03	1.05	0.80	0.89	1.17	0.85
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh, chilled or frozen fish	18.0	15.3	23.4	41.4	28.7	30.5	33.7	35.9	24.3	30.6	32.0	40.1	38.9	50.6	47.3
Crustacea and molluscs, fresh, frozen, dried, salted, etc.	34.5	33.0	39.1	43.6	51.6	59.0	62.1	62.2	64.5	68.5	65.3	70.8	68.1	70.0	71.9
Fish products and preparations, whether or not in airtight containers	19.1	20.6	14.6	18.0	17.0	22.8	20.6	17.8	18.2	14.0	14.1	14.2	16.6	16.0	9.6
Crustacean and mollusc products and preparations, whether or not in airtight containers	2.6	2.7	2.6	3.6	4.1	3.9	4.0	4.7	3.5	5.0	3.4	3.5	3.3	4.4	6.5
Oils and fats, crude or refined, of aquatic animal origin	42.0	33.7	45.0	49.3	79.1	140.8	161.3	154.2	137.6	171.3	114.9	210.3	345.4	178.2	222.2
Meals, solubles and similar animal feedstuffs of aquatic animal origin	53.1	94.8	159.2	325.4	554.0	775.5	1 143.7	1 139.4	1 590.6	1 500.3	1 506.6	1 730.1	2 271.1	1 872.3	2 008.6
	Million cubic metres														
FOREST PRODUCTS															
Pulpwood	—	0.05	0.18	0.24	0.18	0.24	0.34	0.24	0.41	0.34	0.36	0.33	0.36	0.42	0.40
Broadleaved logs	0.48	0.37	0.39	0.28	0.31	0.35	0.31	0.28	0.43	0.55	0.56	0.39	0.40	0.36	0.40
Sawn softwood	0.99	1.75	1.44	1.22	1.26	1.37	1.06	1.05	1.39	1.49	1.66	1.52	1.94	1.71	1.70

[1] Including paddy converted at 65 percent. – [2] Including refined sugar converted at 108.7 percent. – [3] Excluding trade between United States and its territories. – [4] Groundnuts, copra, palm kernels, soybeans, sunflowerseed, linseed, castor beans, cottonseed, olive oil, groundnut oil, coconut oil, palm oil, palm-kernel oil, sunflowerseed oil, linseed oil, castor oil, cottonseed oil.

ANNEX TABLE 6F. – LATIN AMERICA: INDICES OF VOLUME AND VALUE OF EXPORTS AND IMPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS, BY COMMODITY GROUPS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	1957-59 average = 100														
Export volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	96	95	99	106	110	114	120	121	117	129	132	131	137	141	142
Agricultural products	98	95	99	106	110	112	118	119	113	125	129	127	130	136	136
Food and feed	91	98	104	98	110	110	112	108	111	136	135	136	133	137	156
Beverages and tobacco	103	95	95	110	112	111	114	123	111	104	115	118	126	127	118
Raw materials	110	83	99	118	102	127	148	140	125	152	149	122	133	157	129
Fishery products	77	77	95	128	168	214	266	262	317	318	303	352	430	369	397
Forest products	34	108	101	91	93	103	89	88	115	128	139	128	155	158	162
Export value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	104	105	99	96	100	102	105	115	124	129	128	122	128	135	152
Agricultural products	106	105	99	96	99	100	103	112	121	125	123	117	127	128	143
Food and feed	88	104	100	96	103	102	104	122	134	146	144	145	142	148	178
Beverages and tobacco	119	109	98	93	94	88	87	91	101	96	98	90	100	105	116
Raw materials	126	97	100	103	101	131	144	146	134	145	128	105	118	131	109
Fishery products	66	77	96	127	137	175	254	260	306	333	386	379	427	426	563
Forest products	35	114	99	87	88	95	84	85	108	127	137	127	157	179	185
Import volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	85	101	101	97	101	107	110	117	131	129	141	138	151	146	...
Agricultural products	89	99	102	99	103	108	115	125	140	136	147	144	153	145	...
Food and feed	88	98	101	101	104	108	118	128	143	136	149	149	159	150	...
Beverages and tobacco	96	106	110	84	95	109	103	108	112	119	147	117	110	109	...
Raw mateirals	94	104	102	94	106	104	106	118	133	146	137	126	146	139	...
Fishery products	109	112	89	99	112	107	120	154	175	163	206	219	254	264	248
Forest products	67	108	101	92	92	106	89	83	96	101	109	107	130	131	135
Import value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	88	105	101	94	97	100	105	113	132	129	139	139	146	144	...
Agricultural products	91	103	102	96	101	101	111	123	143	137	146	147	148	144	...
Food and feed	90	101	101	97	100	103	115	127	149	139	151	157	158	152	...
Beverages and tobacco	91	107	112	81	79	83	80	89	105	103	129	100	91	90	...
Raw materials	102	109	96	95	119	102	103	113	133	151	131	111	123	122	...
Fishery products	113	115	89	96	107	111	126	136	167	149	204	205	228	243	249
Forest products	73	113	100	87	85	98	82	76	89	96	102	102	127	130	141

ANNEX TABLE 6G. – LATIN AMERICA: ESTIMATED CALORIE AND PROTEIN CONTENT OF NATIONAL AVERAGE FOOD SUPPLY PER CAPUT

	Calories				Total protein				Animal protein			
	Pre-war	1960-1962	1964-1966	1969	Pre-war	1960-1962	1964-1966	1969	Pre-war	1960-1962	1964-1966	1969
	Number per day				*Grammes per day*							
Argentina	2 780	2 810	[1]3 130	[2]3 170	96.5	81.6	[1]87.6	[2]102.7	59.6	52.4	[1]50.7	[2]59.8
Bolivia	...	...	1 760	...	...	...	45.8	...	...	...	12.1	...
Brazil	2 190	[3]2 460	2 540	[4]2 540	63.8	[5]60.0	63.9	[4]63.0	27.9	[3]19.9	22.4	[4]21.8
Chile	2 250	...	2 520	...	69.6	...	65.4	...	21.4	...	25.2	...
Colombia	...	...	2 190	...	...	...	50.1	...	...	...	22.7	...
Costa Rica	...	...	2 230	...	...	...	56.3	...	...	...	24.2	...
Dominican Republic	...	...	2 080	...	...	...	45.7	...	...	...	17.4	...
Ecuador	...	...	1 850	...	...	...	46.7	...	...	...	16.2	...
El Salvador	...	...	1 880	...	...	...	47.0	...	...	...	14.1	...
Guatemala	...	...	1 950	...	...	...	49.2	...	...	...	11.9	...
Honduras	...	...	1 930	...	...	...	48.6	...	...	...	13.1	...
Jamaica	...	...	2 280	...	...	...	59.1	...	...	...	26.5	...
Mexico	...	[6]2 500	2 620	...	...	[6]65.0	66.3	...	...	[6]15.5	14.2	...
Nicaragua	...	...	2 250	...	...	...	60.7	...	...	...	19.8	...
Panama	...	2 330	[1]2 340	2 450	...	60.5	[1]61.4	63.8	...	23.0	[1]24.5	27.2
Paraguay	...	...	2 730	...	...	...	68.1	...	...	...	29.8	...
Peru	...	2 260	[1]2 160	[2]2 200	...	55.5	[1]51.3	[2]52.4	...	20.0	[1]18.5	[2]18.4
Surinam	...	1 920	[1]2 170	[6]2 350	...	47.0	[1]51.4	[6]61.9	...	17.4	[1]17.2	[6]25.6
Uruguay	...	...	3 020	...	...	...	105.0	...	...	...	71.8	...
Venezuela	...	2 300	[1]2 390	[7]2 490	...	58.7	[1]63.6	[7]65.9	...	23.0	[1]26.3	[7]26.4

[1] 1963-65. – [2] 1967. – [3] 1961-63. – [4] 1966-68. – [5] 1961-62. – [6] 1968. – [7] 1966.

ANNEX TABLE 7A. – FAR EAST: BASIC DATA ON NATIONAL AGRICULTURE

	Period	Population in agriculture		Agricultural GDP			Share of agriculture in value of total trade		Arable land per person in agriculture	Fertilizer consumption per hectare of arable land
							Exports	Imports		
		Thousands	*Percent of total*	*Million dollars*	*Percent of total*	*Dollars per caput*	..... *Percent*		*Hectares per caput*	*Kilogrammes per hectare*
Burma	1950	...	...	317	40	...	...	...	...	—
	1960	...	...	475	32	...	93	17	...	1
	1965	15 334	62	566	32	37	85	15	1.04	1
	1968	15 932	60	632	34	40	...	...	1.01	3
Cambodia	1950	...	...	225	[1]56	...	...	...	...	—
	1960	[2]3 332	70	286	45	86	...	...	0.71	—
	1965	4 695	75	366	42	78	99	8	0.63	1
	1966	4 964	73	376	41	76	160	7	0.60	1
Ceylon	1950	...	...	469	58	...	...	...	...	19
	1960	...	...	606	46	...	97	41	...	39
	1965	5 582	50	647	42	116	97	53	0.34	41
	1968	6 407	54	655	39	102	95	47	0.31	60
China (Taiwan)	1950	...	...	[3]280	[3]35	...	...	...	...	92
	1960	...	...	505	31	...	...	...	...	201
	1965	5 846	47	692	26	118	65	32	0.15	257
	1968	6 277	45	828	23	132	40	27	0.14	317
India	1950	[3]249 122	70	10 207	51	41	...	...	0.53	—
	1960	[4]313 170	73	14 826	50	47	44	29	[4]0.51	2
	1965	340 655	70	21 223	46	62	38	31	0.48	5
	1967	357 535	68	20 550	52	57	41	38	0.46	11
Japan	1950	[1]37 954	44	...	[1]24	...	[3]11	[3]73	0.13	152
	1960	23 748	25	5 229	15	220	12	43	0.26	304
	1965	23 685	24	8 192	12	346	6	43	0.25	321
	1968	22 534	22	13 206	10	586	5	38	0.25	405
Korea, Rep. of	1960	14 165	57	1 043	40	74	...	...	0.09	137
	1965	15 594	55	1 136	41	73	35	33	0.14	149
	1968	16 074	52	1 684	32	105	32	26	0 14	207
Pakistan	1950	...	...	3 639	58	...	...	...	...	—
	1960	[4]69 525	[4]75	3 875	53	56	...	...	0.42	3
	1965	83 842	74	4 904	47	58	62	23	0.34	5
	1968	89 208	72	6 533	46	73	49	23	0.32	12
Philippines	1950	[5]13 267	69	[6]1 143	41	67	...	...	0.50	3
	1960	12 140	44	[6]1 841	32	97	...	...	0.56	12
	1965	18 738	58	2 488	32	82	85	25	0.44	14
	1968	19 745	55	3 443	34	174	76	16	0.43	17
Thailand	1950	12 211	66	...	...	...	...	...	0.39	—
	1960	21 648	82	1 032	39	48	89	11	0.13	2
	1965	24 001	78	1 251	32	52	84	9	0.48	3
	1968	25 242	75	1 515	30	60	77	8	0.45	9
Viet-Nam, Rep. of	1960	...	...	508	37	...	...	...	...	8
	1965	13 705	85	545	31	40	98	44	0.21	32
	1968	14 371	83	905	30	63	94	71	0.19	34

[1] 1952. – [2] 1958. – [3] 1951. – [4] 1961. – [5] 1948. – [6] Net domestic product at factor cost.

ANNEX TABLE 7B. – FAR EAST:[1] VOLUME OF PRODUCTION OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat	12.63	13.57	12.11	14.53	15.01	15.50	16.98	15.78	14.99	17.87	15.27	16.74	23.92	26.20	28.53
Maize	8.66	8.95	10.07	10.49	11.09	12.35	13.66	12.65	14.37	13.21	14.85	15.33	15.68	15.58	17.12
Millet and sorghum	15.05	16.75	118.08	17.15	18.86	16.88	18.79	18.23	19.33	15.22	18.06	20.23	18.21	20.05	20.60
Rice (milled equivalent)[2]	69.66	63.82	72.54	76.02	80.75	83.38	82.25	88.72	91.73	82.69	82.72	90.88	96.19	100.38	104.47
Sugar (centrifugal)	4.87	5.41	5.54	5.71	5.87	6.80	6.54	6.09	6.56	7.60	8.08	6.41	6.40	8.47	9.56
Sugar (noncentrifugal)	5.35	6.78	6.90	7.47	7.06	7.81	7.94	8.38	8.79	9.53	9.21	8.65	8.77	9.97	9.88
Pulses[3]	8.94	9.52	8.38	11.08	9.71	10.49	10.22	9.92	8.80	10.14	8.29	7.83	10.36	8.96	10.27
Soybeans	0.81	0.86	0.88	0.88	0.89	0.91	0.88	0.83	0.88	0.91	0.95	0.99	10.3	1.00	1.15
Groundnuts	5.21	5.65	6.17	5.61	5.99	6.13	6.26	6.36	7.06	5.38	5.66	7.03	6.00	6.56	7.54
Copra	2.86	2.89	2.33	2.13	2.75	2.73	2.47	2.65	2.70	2.69	2.84	2.53	2.62	2.62	2.69
Total vegetable oils and oilseeds (oil equivalent)[4]	5.26	5.46	5.21	4.93	5.54	5.67	5.71	5.87	5.96	5.64	5.77	6.14	6.14	6.26	6.86
Tea	0.59	0.60	0.63	0.64	0.64	0.69	0.69	0.70	0.72	0.73	0.73	0.74	0.76	0.74	0.77
Tobacco	0.67	0.71	0.61	0.76	0.72	0.74	0.81	0.82	0.84	0.86	0.86	0.93	1.00	0.95	0.96
Cotton (lint)	1.26	1.31	1.23	1.07	1.36	1.27	1.49	1.61	1.50	1.47	1.53	1.74	1.66	1.66	1.59
Jute[5]	2.20	2.14	2.47	2.17	2.04	3.23	2.71	2.85	2.75	2.97	3.20	3.17	2.04	3.03	2.79
Rubber (natural)	1.80	1.83	1.80	1.87	1.82	1.93	1.96	2.01	2.09	2.16	2.23	2.22	2.42	2.69	2.70
Milk (total)	30.98	31.36	31.73	32.11	32.50	32.91	33.27	33.68	34.12	34.52	34.84	35.45	36.08	36.75	37.41
Meat[6]	2.52	2.66	2.69	2.79	2.81	2.88	2.95	3.01	3.09	3.27	3.34	3.39	3.46	3.61	3.71
Eggs	0.50	0.52	0.52	0.57	0.58	0.60	0.61	0.65	0.69	0.71	0.72	0.74	0.78	0.83	0.84
FISHERY PRODUCTS[7]	...	...	...	...	4.74	4.89	5.08	5.57	6.25	6.49	7.00	7.43	8.27	8.76	9.44
FOREST PRODUCTS															
Industrial roundwood[8]	26.0	27.4	27.7	29.6	32.3	33.9	36.2	40.8	40.6	43.9	47.4	52.8	56.6	58.1	61.5
Sawn softwood[8]	0.95	0.99	0.85	0.94	0.95	1.06	1.30	1.58	1.89	2.01	1.77	1.86	2.15	2.11	2.10
Sawn hardwood[8]	6.6	7.2	6.8	6.4	6.9	7.2	7.2	7.9	8.4	9.1	9.4	10.5	10.2	11.2	11.5
Plywood[8]	0.15	0.20	0.27	0.38	0.45	0.44	0.53	0.65	0.85	1.06	1.27	1.27	1.93	2.09	2.20
Mechanical wood pulp	0.02	0.03	0.03	0.04	0.07	0.08	0.08	0.09	0.10	0.10	0.11	0.11	0.13	0.15	0.16
Chemical wood pulp	—	—	—	—	—	0.02	0.02	0.03	0.04	0.10	0.10	0.13	0.16	0.16	0.18
Newsprint	0.03	0.03	0.04	0.06	0.08	0.10	0.11	0.12	0.13	0.13	0.14	0.15	0.16	0.18	0.20
Other paper and paperboard	0.36	0.40	0.45	0.52	0.64	0.75	0.83	0.94	1.02	1.08	1.15	1.28	1.42	1.54	1.72

[1] Excluding mainland China and Japan. – [2] Paddy converted at 65 percent. – [3] Dry beans, dry peas, broad beans, chick-peas, lentils. – [4] Palm oil, soybeans, groundnuts, cottonseed, sesame seed, rapeseed, copra, palm kernels, linseed, castor beans. – [5] Including allied fibres. – [6] Beef and veal, mutton and lamb, pork, poultry meat. – [7] Nominal catch (liveweight). – [8] Million cubic metres.

ANNEX TABLE 7C. – FAR EAST:[1] INDICES OF FOOD AND TOTAL AGRICULTURAL PRODUCTION

	Total agricultural production							Food production						
	1964	1965	1966	1967	1968	1969	1970 (Preliminary)	1964	1965	1966	1967	1968	1969	1969 (Preliminary)
	1952-56 average = 100													
Total production														
ASIA AND FAR EAST (developing countries)	136	134	135	141	148	155	160	137	134	135	141	149	156	162
South Asia	128	124	123	133	140	145	150	128	124	122	132	141	146	152
Ceylon	143	141	140	147	152	151	156	159	147	143	154	161	162	174
India	129	122	121	131	137	142	148	128	122	121	130	138	143	150
Nepal	95	96	91	97	101	106	109	94	96	91	97	101	105	108
Pakistan	129	134	134	145	154	162	163	132	135	134	145	156	163	165
East and Southeast Asia	143	145	151	148	155	164	171	146	146	152	149	157	165	173
Burma	140	135	120	137	142	145	148	141	136	122	138	141	144	148
China (Taiwan)	145	158	163	172	177	177	185	144	157	163	171	177	176	184
Indonesia	119	119	124	118	128	129	138	124	121	127	120	132	132	143
Khmer Republic[2]	166	154	145	154	185	162	200	163	150	140	149	182	156	209
Korea, Rep. of	172	171	184	168	167	190	191	175	173	185	167	165	190	188
Malaysia														
Sabah	136	142	139	143	159	172	174	143	152	147	154	176	186	186
Sarawak	150	147	139	121	126	159	131	167	174	182	162	185	210	214
West Malaysia	141	151	159	163	180	202	208	159	171	176	180	194	208	223
Philippines	140	147	151	147	148	163	167	137	146	149	146	146	162	165
Thailand	175	185	214	187	196	215	220	170	174	202	179	192	208	212
Viet-Nam, Rep. of	179	175	158	165	156	173	188	185	182	166	175	166	187	202
Per caput production														
ASIA AND FAR EAST (developing countries)	107	103	102	103	106	108	109	108	104	102	103	107	108	110
South Asia	102	97	93	98	101	102	103	102	96	93	98	102	103	104
Ceylon	112	107	104	107	108	105	106	124	112	106	112	115	112	119
India	104	96	93	98	100	101	103	104	96	93	97	101	102	104
Nepal	79	79	74	77	79	81	81	78	78	73	76	78	80	81
Pakistan	97	98	95	100	103	105	103	99	99	95	100	105	106	104
East and Southeast Asia	111	110	111	106	109	112	113	113	111	112	107	109	112	114
Burma	116	109	96	107	108	107	108	116	110	97	107	107	107	108
China (Taiwan)	108	114	114	118	119	117	119	107	114	114	117	119	116	119
Indonesia	96	93	95	88	93	91	95	99	95	97	90	96	94	98
Khmer Republic[2]	127	115	105	109	127	109	131	125	112	102	105	125	104	136
Korea, Rep. of	132	128	135	119	116	128	125	135	129	135	119	114	128	123
Malaysia														
Sabah	100	101	94	93	100	105	102	105	107	99	100	111	113	109
Sarawak	118	113	104	86	88	108	86	132	134	136	116	129	142	140
West Malaysia	104	108	111	110	118	129	129	117	123	123	122	127	133	139
Philippines	102	104	103	97	94	100	99	100	103	102	96	93	100	98
Thailand	130	133	149	126	129	137	136	126	125	141	121	126	132	131
Viet-Nam, Rep. of	142	135	119	121	111	120	127	147	140	125	128	118	130	137

[1] Excluding mainland China and Japan. — [2] Formerly Cambodia.

ANNEX TABLE 7D. – FAR EAST:[1] VOLUME OF IMPORTS OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat and wheat flour (wheat equivalent)	3.15	5.23	5.49	5.94	7.52	6.12	5.86	8.19	9.67	10.81	11.42	12.15	10.33	8.67	9.90
Barley	0.28	0.27	0.36	0.02	0.02	0.18	0.11	0.22	0.21	0.12	0.01	0.04	0.21	0.22	0.28
Maize	0.14	0.17	0.15	0.24	0.29	0.37	0.47	0.46	0.32	0.39	0.34	0.73	0.65	0.93	1.25
Millet and sorghums	—	0.01	0.09	0.05	0.02	0.02	0.03	0.02	0.02	0.07	1.59	2.17	0.44	0.42	0.44
Rice (milled equivalent)[2]	3.27	3.70	3.35	2.90	3.72	3.62	3.36	3.93	4.00	3.50	3.62	3.80	3.60	3.41	4.08
Sugar (raw equivalent)[3]	0.93	0.79	0.91	0.74	0.83	0.92	1.01	0.90	0.91	1.07	1.24	1.24	1.76	1.63	1.59
Dates	0.10	0.07	0.07	0.07	0.07	0.07	0.04	0.07	0.04	0.07	0.07	0.09	0.07	0.09	0.09
Vegetable oils and oilseeds (oil equivalent)[4]	0.28	0.34	0.30	0.31	0.34	0.33	0.38	0.39	0.50	0.35	0.37	0.48	0.46	0.57	0.78
Milk (condensed, evaporated and powdered)	0.36	0.39	0.33	0.34	0.34	0.38	0.40	0.43	0.41	0.39	0.41	0.36	0.42	0.45	0.42
Cotton (lint)	0.26	0.30	0.24	0.29	0.45	0.47	0.45	0.43	0.46	0.48	0.49	0.57	0.64	0.55	0.65
Jute and kenaf	0.19	0.13	0.10	0.07	0.16	0.11	0.10	0.07	0.09	0.14	0.10	0.03	0.05	0.03	0.03
Rubber (natural)[5]	0.03	0.04	0.04	0.04	0.05	0.06	0.07	0.06	0.07	0.06	0.06	0.08	0.06	0.09	0.09
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh, chilled or frozen fish	52.7	67.5	71.7	77.1	81.4	76.0	89.1	97.8	107.7	109.4	115.6	113.4	110.9	109.3	117.5
Dried, salted or smoked fish	100.1	105.9	102.0	101.1	102.7	80.1	57.5	64.4	62.0	55.8	72.0	57.8	62.7	64.0	66.3
Crustacea and molluscs, fresh, frozen, dried, salted, etc.	31.2	32.7	36.6	35.0	39.4	36.3	34.2	43.3	42.0	39.5	42.5	40.3	24.6	32.9	33.7
Fish products and preparations, whether or not in airtight containers	62.2	74.2	90.6	69.9	107.8	96.6	62.9	67.8	67.1	64.2	73.8	82.4	96.2	103.3	107.5
Crustacean and mollusc products and preparations, whether or not in airtight containers	12.3	15.2	15.6	18.0	21.5	17.9	17.9	20.1	17.2	17.1	12.6	21.8	23.9	24.6	25.8
Oils and fats, crude or refined, of aquatic animal origin	0.7	0.8	0.6	1.2	2.0	1.6	1.9	1.8	1.6	1.6	2.1	5.2	5.9	6.2	7.1
Meals, solubles and similar animal feedstuffs of aquatic animal origin	18.0	21.0	21.7	34.2	31.9	44.8	44.3	42.7	49.2	52.8	55.8	70.9	86.2	97.3	94.5
	Million metric tons														
FOREST PRODUCTS															
Coniferous logs[6]	0.06	0.08	0.04	0.04	0.02	0.01	0.11	0.19	0.23	0.14	0.25	0.31	0.48	0.23	0.25
Broadleaved logs[6]	0.50	0.66	0.58	0.71	0.90	0.92	1.31	1.39	2.31	2.77	3.74	4.05	5.59	5.86	6.10
Sawn softwood[6]	0.14	0.17	0.30	0.41	0.21	0.16	0.16	0.16	0.19	0.15	0.13	0.17	0.16	0.16	0.15
Sawn hardwood[6]	0.12	0.12	0.08	0.10	0.09	0.09	0.12	0.12	0.35	0.30	0.37	0.40	0.65	0.67	0.70
Chemical wood pulp	0.04	0.06	0.07	0.14	0.16	0.21	0.26	0.28	0.25	0.23	0.28	0.28	0.35	0.39	0.42
Newsprint	0.21	0.21	0.19	0.22	0.23	0.29	0.24	0.26	0.26	0.27	0.34	0.32	0.42	0.46	0.50
Other paper and paperboard	0.31	0.35	0.29	0.33	0.37	0.39	0.37	0.41	0.49	0.46	0.56	0.62	0.67	0.69	0.75

[1] Excluding Japan. – [2] Including paddy converted at 65 percent. – [3] Including refined sugar converted at 108.7 percent. – [4] Groundnuts, copra, palm kernels, soybeans, sunflowerseed, castor beans, linseed, cottonseed, olive oil, groundnut oil, coconut oil, palm oil, palm-kernel oil, soybean oil, linseed oil, castor oil, cottonseed oil. – [5] Excluding imports into Malaysia for reexport. – [6] Million cubic metres.

ANNEX TABLE 7E. – FAR EAST:[1] VOLUME OF EXPORTS OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Maize	0.20	0.19	0.31	0.45	0.71	0.71	0.64	0.89	1.28	0.92	1.37	1.34	1.65	1.71	1.81
Rice (milled equivalent) [2]	3.50	3.98	3.23	3.55	3.82	3.85	3.57	4.25	4.26	4.25	3.39	2.64	1.90	1.96	2.17
Sugar (raw equivalent) [3]	1.98	2.03	2.05	1.79	2.20	2.23	2.18	2.68	2.57	2.54	2.58	1.96	2.00	1.93	2.36
Pulses (dry)	0.13	0.12	0.12	0.15	0.15	0.16	0.16	0.20	0.16	0.22	0.22	0.18	0.17	0.21	0.23
Vegetable oils and oilseeds (oil equivalent) [4,5]	1.57	1.46	1.23	1.16	1.35	1.42	1.33	1.55	1.55	1.39	1.69	1.47	1.69	1.56	1.68
Oilseed cake and meal	0.50	0.46	0.59	0.98	0.88	1.01	1.31	1.54	1.63	1.48	1.45	1.34	1.57	1.28	1.49
Coffee (green)	0.10	0.11	0.08	0.08	0.09	0.16	0.13	0.17	0.15	0.15	0.16	0.25	0.18	0.20	0.20
Tea	0.46	0.43	0.48	0.45	0.44	0.45	0.47	0.48	0.47	0.48	0.44	0.48	0.42	0.48	0.48
Pepper and pimento	0.10	0.09	0.08	0.10	0.08	0.10	0.11	0.11	0.09	0.08	0.10	0.13	0.14	0.12	0.11
Cotton (lint)	0.23	0.17	0.18	0.12	0.14	0.10	0.15	0.22	0.23	0.18	0.12	0.24	0.25	0.15	0.15
Jute and kenaf	0.87	0.80	0.94	0.89	0.83	0.75	0.99	0.89	1.00	1.11	1.19	1.06	0.98	0.83	0.81
Rubber (natural) [6]	1.82	1.83	1.83	2.12	1.85	2.06	2.12	2.09	2.08	2.14	2.04	2.10	2.48	2.58	2.60
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh, chilled or frozen fish	44.9	38.8	40.2	52.6	54.4	54.7	74.9	84.2	99.5	93.3	107.9	214.0	109.6	103.2	134.7
Dried, salted or smoked fish	73.0	66.0	67.0	66.7	55.1	52.3	43.9	40.7	37.6	33.9	46.0	39.8	42.2	40.7	39.3
Crustacea and molluscs, fresh, frozen, dried, salted, etc.	20.2	25.5	25.3	23.9	26.8	33.3	35.1	39.2	53.8	56.9	58.5	63.8	65.7	76.8	97.5
Fish products and preparations, whether or not in airtight containers	7.9	7.3	7.9	5.4	4.7	7.6	3.5	4.3	5.6	9.0	8.1	5.1	5.3	4.8	5.8
Crustacean and mollusc products and preparations, whether or not in airtight containers	5.6	6.1	7.4	8.6	9.7	9.8	10.2	9.2	9.6	10.7	11.3	12.7	12.6	11.0	7.5
Oils and fats, crude or refined, of aquatic animal origin	—	0.6	1.8	2.4	1.7	1.1	0.4	0.1	—	0.4	0.3	0.4	0.9	—	0.8
Meals, solubles and similar animal feedstuffs of aquatic animal origin	3.2	4.2	2.3	7.0	5.7	8.1	11.9	12.4	14.8	21.9	29.2	25.7	24.2	28.7	25.5
	Million cubic metres														
FOREST PRODUCTS															
Broadleaved logs	3.57	3.99	4.66	6.51	6.91	7.81	8.31	10.73	11.69	13.21	14.40	16.55	20.31	23.99	26.67
Sawn hardwood	0.80	0.82	0.86	0.87	1.17	1.01	0.97	1.26	1.63	1.65	1.54	1.63	2.08	2.37	2.34
Plywood	0.03	0.05	0.10	0.20	0.17	0.24	0.31	0.48	0.72	0.86	1.09	1.15	1.71	2.01	1.99

[1] Excluding Japan. – [2] Including paddy converted at 65 percent. – [3] Including refined sugar converted at 108.7 percent. – [4] Groundnuts, copra, palm kernels, soybeans, cottonseed, groundnut oil, coconut oil, palm oil, palm-kernel oil, soybean oil, cottonseed oil. – [5] Excluding reexport of copra from Malaysia, but including unrecorded shipments of copra from Indonesia and the Philippines to Malaysia. – [6] Excluding imports into Malaysia for reexport and exports from Hong Kong, but including unrecorded shipments from Indonesia to Malaysia.

ANNEX TABLE 7F. – FAR EAST:[1] INDICES OF VOLUME AND VALUE OF EXPORTS AND IMPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS, BY COMMODITY GROUPS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	1957-59 average = 100														
Export volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	100	99	98	103	102	109	112	121	124	125	124	126	136	136	142
Agricultural products	101	100	98	102	101	108	110	118	118	118	115	115	121	117	123
Food and feed	101	107	95	98	111	116	111	132	135	129	132	111	111	107	118
Beverages and tobacco	102	98	105	97	96	109	112	118	112	115	108	130	123	115	125
Raw materials	99	96	97	107	96	101	108	108	109	111	106	111	127	125	125
Fishery products	96	95	100	105	103	109	111	119	138	146	166	208	176	184	212
Forest products	74	80	93	126	135	147	156	211	257	288	322	358	475	558	584
Sawlogs	71	79	92	129	137	155	165	213	233	263	286	329	405	476	528
Wood-based panels	19	33	84	184	123	204	258	425	655	782	1 017	1 099	1 664	2 012	1 981
Export value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	101	100	93	107	111	106	106	118	118	118	118	115	120	129	135
Agricultural products	101	101	93	106	109	103	102	112	111	109	106	101	100	103	108
Food and feed	96	103	96	101	106	110	109	142	151	139	140	128	128	118	134
Beverages and tobacco	105	100	104	96	99	102	101	107	105	105	98	111	103	92	105
Raw materials	103	99	86	115	116	99	98	94	86	90	86	77	79	96	90
Fishery products	93	96	100	104	105	115	141	164	190	195	237	267	298	343	390
Forest products	84	79	91	130	156	157	178	236	267	301	358	414	531	681	707
Sawlogs	73	75	90	135	173	181	208	271	274	320	392	465	572	772	831
Wood-based panels	21	27	75	197	101	165	247	381	515	589	788	907	1 291	1 515	1 462
Import volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	88	102	98	100	120	117	117	132	143	145	160	173	174	172	191
Agricultural products	89	103	98	98	121	117	117	133	143	145	158	173	169	165	185
Food and feed	85	102	100	98	117	110	110	130	144	145	159	174	162	156	176
Beverages and tobacco	115	108	93	99	94	121	124	123	88	91	119	111	165	194	163
Raw materials	96	107	90	102	153	156	157	150	158	167	169	198	212	205	246
Fishery products	85	97	103	100	116	103	89	100	101	97	110	110	110	118	128
Forest products	86	95	90	115	114	128	137	148	187	183	225	226	290	308	327
Sawlogs	80	105	89	106	132	133	202	226	362	415	570	623	865	871	908
Pulp and paper	87	100	87	112	125	150	147	157	165	157	186	183	219	244	262
Import value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	90	107	97	96	114	112	112	128	150	145	163	178	181	181	...
Agricultural products	90	108	98	95	114	111	111	128	149	143	158	174	172	168	...
Food and feed	84	107	99	94	109	103	104	126	151	142	160	177	171	164	...
Beverages and tobacco	111	104	96	100	94	113	106	107	94	100	125	124	129	170	...
Raw materials	117	114	90	96	148	158	153	144	156	166	162	168	192	188	...
Fishery products	86	99	106	95	115	101	101	109	119	115	129	139	157	168	166
Forest products	90	100	88	112	111	124	134	146	192	189	247	253	323	366	399
Sawlogs	83	105	83	112	144	161	233	294	466	499	802	897	1 237	1 420	1 511
Pulp and paper	91	106	87	107	116	139	136	140	151	149	175	173	198	224	253

[1] Excluding mainland China and Japan.

ANNEX TABLE 7G. – FAR EAST: ESTIMATED CALORIE AND PROTEIN CONTENT OF NATIONAL AVERAGE FOOD SUPPLY PER CAPUT

	Calories					Total protein					Animal protein				
	Pre-war	1948-1950	1963-1965	1956-1968	1969	Pre-war	1948-1950	1963-1965	1966-1968	1969	Pre-war	1948-1950	1963-1965	1966-1968	1969
	Number per day					*Grammes per day*									
Ceylon	...	...	2 110	2 170	2 210	...	...	45.3	47.5	48.0	...	...	8.3	8.5	8.5
China (Taiwan)	1 870	1 980	2 340	2 460	2 620	45.1	43.3	59.7	63.4	68.2	15.5	8.3	17.2	19.3	20.9
India [1]	[2]1 950	[3]1 740	2 000	1 880	[4]1 940	[2]52.2	[3]44.9	49.5	48.1	[4]47.9	[2]8.2	[3]5.4	6.0	5.5	[4]5.6
Indonesia [1]	...	...	[5]1 750	...	...	...	...	[5]38.2	...	...	...	...	[5]5.2	...	...
Japan [6]	2 020	...	2 410	2 450	2 450	59.7	...	73.3	74.7	75.1	7.7	...	25.7	28.3	29.7
Korea, Rep. of	...	...	2 280	2 420	[7]2 510	...	...	62.5	66.8	[7]69.0	...	...	7.0	7.6	[7]8.3
Malaysia, West	...	...	[5]2 190	...	...	...	...	[5]49.1	...	...	...	...	[5]14.7	...	...
Pakistan [1]	[2]1 950	[3]2 020	2 260	2 260	[4]2 350	[2]52.2	[3]48.3	50.9	51.3	[4]53.5	[2]8.2	[3]7.7	9.9	10.0	[4]10.0
Philippines	...	...	2 020	2 000	1 990	...	...	48.9	50.9	51.6	...	...	16.1	19.1	20.0

[1] Split years. – [2] India and Pakistan. – [3] 1949/-50/. – [4] 1968/69. – [5] 1964-66. – [6] Fiscal year April-March. – [7] 1968.

ANNEX TABLE 8A. – NEAR EAST: BASIC DATA ON NATIONAL AGRICULTURE

	Period	Population in agriculture		Agricultural GDP			Share of agriculture in value of total trade		Arable land per person in agriculture	Fertilizer consumption per hectare of arable land
							Exports	Imports		
		Thousands	*Percent of total*	*Million dollars*	*Percent of total*	*Dollars per caput*	..... *Percent*		*Hectares per caput*	*Kilogrammes per hectare*
Cyprus	1950	258	53	29	27	112	[1]44	[1]22	1.68	11
	1960	240	40	44	17	185	36	26	1.85	30
	1965	230	39	78	22	339	54	21	1.88	44
	1968	238	38	92	21	387	56	20	1.82	69
Iran	1950	[2]10 065	55	...	...	...	...	...	...	...
	1960	12 096	60	1 212	29	100	...	...	0.96	1
	1965	12 195	49	1 631	26	134	8	18	...	...
	1968	14 952	55	1 773	[3]22	119	6	11	0.76	7
Iraq	1960	[4]2 832	48	269	17	95	...	...	2.65	—
	1965	3 959	48	460	20	116	5	27	1.89	—
	1968	4 752	52	412	19	87	4	25	1.58	2
Israel	1950	224	18	[5, 6]70	11	313	...	...	1.56	43
	1960	[7]273	13	[6]230	12	844	38	27	[7]1.51	81
	1965	310	12	[6]250	9	807	30	23	1.29	100
	1968	318	12	321	8	1 009	26	19	1.29	112
Jordan	1960	[7]595	35	40	16	67	...	...	[7]1.70	2
	1965	630	33	97	23	154	54	33	1.79	4
	1968	651	31	88	16	135	55	35	2.00	2
Lebanon	1950	...	...	...	...	...	[8]59	[8]46	...	12
	1960	...	...	...	18	...	...	...	...	49
	1965	1 213	55	138	12	114	60	36	0.24	48
	1967	1 322	53	136	11	103	33	35	0.24	76
Saudi Arabia	1965	3 105	72	205	8	66	...	...	0.12	18
	1967	3 494	70	251	8	72	...	...	0.23	5
Syria	1960	2 571	56	187	28	73	...	...	2.48	3
	1965	2 877	55	229	28	80	89	27	2.09	3
	1968	2 978	52	279	25	94	80	25	1.96	5
Turkey	1950	[9]13 475	72	1 643	49	122	[8]87	[8]14	1.13	—
	1960	20 625	75	2 187	42	106	88	12	1.22	1
	1965	22 740	73	2 890	36	127	88	11	1.15	6
	1968	23 687	71	4 208	33	178	89	4	1.17	14
Libya	1960	855	72	...	...	...	84	14	...	[10]3
	1965	647	40	71	5	110	1	15	...	...
	1968	1 053	57	72	3	87	—	15	2.39	4
Sudan, The	1950	[2]3 292	87	...	...	...	...	...	...	210
	1960	...	...	579	57	...	...	...	...	...
	1965	10 426	77	[11]680	[11]54	65	99	27	...	...
	1967	11 000	74	744	22	68	99	26	0.64	7
United Arab Republic	1950	[12]13 120	64	674	41	51	[8]91	[8]38	0.19	26
	1960	14 706	57	884	31	60	81	32	0.17	84
	1965	16 225	55	1 417	29	87	71	37	0.17	122
	1967	16 410	52	1 493	30	91	72	44	0.17	116

[1] 1953. – [2] 1956. – [3] 1967. – [4] 1957. – [5] 1952. – [6] Net domestic product. – [7] 1961. – [8] 1951. – [9] 1945. – [10] Tripolitania only. – [11] 1964. – [12] 1947.

ANNEX TABLE 8B. – NEAR EAST:[1] VOLUME OF PRODUCTION OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat	15.29	17.65	16.67	16.25	16.75	15.78	18.13	18.14	17.33	18.59	19.09	20.24	20.91	21.35	19.82
Barley	6.14	7.45	6.43	5.94	6.22	5.74	6.98	7.37	6.00	6.62	6.62	6.66	6.79	7.54	6.00
Maize	3.22	2.99	3.40	3.30	3.56	3.40	3.58	3.65	3.74	3.88	4.17	4.07	4.16	4.27	4.32
Rice (milled)[2]	1.63	1.79	1.37	1.72	1.83	1.54	2.34	2.45	2.40	2.34	2.28	2.80	2.98	2.97	2.90
Sugar (centrifugal)	0.72	0.77	0.82	1.00	1.16	0.97	0.94	1.09	1.41	1.25	1.46	1.74	1.77	1.74	1.90
Pulses[3]	0.86	0.93	0.89	0.87	0.91	0.79	1.05	0.96	1.15	1.16	1.08	1.03	1.03	1.12	1.00
Citrus fruit	0.78	0.90	0.96	0.91	0.94	0.97	1.13	1.27	1.25	1.04	1.63	1.83	1.89	1.99	2.06
Dates	1.36	1.30	1.44	1.25	1.42	1.53	1.53	1.49	1.32	1.37	1.40	1.34	1.22	1.39	1.40
Olive oil	0.14	0.07	0.13	0.09	0.11	0.18	0.09	0.15	0.18	0.12	0.21	0.15	0.22	0.10	0.15
Cottonseed	1.49	1.69	1.63	1.82	1.90	1.76	2.20	2.19	2.29	2.49	2.27	2.27	2.48	2.68	2.56
Total vegetable oils and oilseeds (oil equivalent)[4]	0.64	0.59	0.68	0.69	0.69	0.76	0.73	0.83	0.92	0.89	0.94	0.91	0.96	1.01	1.11
Tobacco	0.15	0.16	0.14	0.16	0.17	0.14	0.13	0.16	0.24	0.19	0.22	0.24	0.22	0.18	0.19
Cotton (lint)	0.79	0.88	0.87	0.98	1.03	0.94	1.20	1.18	1.27	1.39	1.31	1.33	1.44	1.56	1.53
Wool (greasy)	0.11	0.11	0.12	0.13	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.14	0.14
Milk (total)	9.07	9.00	9.93	10.15	10.04	9.90	10.08	10.15	10.43	10.68	11.10	11.26	11.48	11.55	11.84
Meat[5]	1.29	1.33	1.33	1.38	1.43	1.48	1.53	1.56	1.56	1.62	1.67	1.67	1.72	1.81	1.84
FISHERY PRODUCTS[6]	...	...	...	...	0.39	0.41	0.43	0.49	0.52	0.50	0.49	0.55	0.50	0.57	0.63
FOREST PRODUCTS															
Industrial roundwood[7]	8.1	8.5	8.4	8.4	8.7	8.4	8.8	9.6	10.5	11.2	11.5	12.4	13.0	13.7	14.0
Sawn softwood[7]	0.58	0.71	0.64	0.73	0.81	0.81	1.13	1.16	1.37	1.48	1.96	2.04	2.23	2.50	2.50
Sawn hardwood[7]	0.20	0.22	0.28	0.26	0.30	0.28	0.40	0.41	0.45	0.53	0.53	0.60	0.61	0.73	0.73

[1] Excluding Israel. – [2] Paddy converted at 65 percent. – [3] Dry beans, dry peas, broad beans, chick-peas, lentils. – [4] Olive oil, soybeans, groundnuts, cottonseed, sesame seed, sunflowerseed, rapeseed, linseed, hempseed, castor beans. – [5] Beef and veal, mutton and lamb, pork, poultry meat. – [6] Nominal catch (liveweight). – [7] Million cubic metres.

ANNEX TABLE 8C. – NEAR EAST:[1] INDICES OF FOOD AND TOTAL AGRICULTURAL PRODUCTION

	Total agricultural production							Food production						
	1964	1965	1966	1967	1968	1969	1970 (Preliminary	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	1952-56 average = 100													
Total production														
NEAR EAST (developing countries)	141	145	148	153	159	163	163	137	141	145	150	155	159	159
Near East in Africa	142	148	150	154	155	171	173	143	148	153	157	159	171	175
Libya	136	179	189	190	213	194	192	137	195	195	198	222	200	196
Sudan	140	156	165	190	172	205	209	145	153	161	185	164	194	199
United Arab Republic	143	146	146	142	152	164	165	143	146	152	149	162	168	173
Near East in Asia (developing countries)	139	142	146	151	158	159	157	134	137	141	147	153	154	152
Afghanistan	125	127	123	132	136	140	136	123	125	121	130	134	136	131
Cyprus	125	172	170	212	213	238	243	127	173	174	217	218	244	249
Iran	134	154	155	156	179	173	170	129	146	151	152	172	166	163
Iraq	123	134	135	143	167	165	150	122	135	135	143	168	166	148
Jordan	206	192	134	151	122	138	110	206	190	131	148	119	135	106
Lebanon	176	184	191	211	208	190	192	174	182	189	211	206	187	189
Saudi Arabia	133	142	146	147	145	150	152	133	142	146	147	145	150	152
Syria	164	163	126	151	145	155	138	145	141	109	145	132	145	121
Turkey	146	141	157	160	168	166	171	140	137	151	152	160	161	166
Yemen Arab Rep.	99	99	97	97	94	94	100	98	98	96	96	94	94	100
Yemen, People's Dem. Rep.	117	124	110	111	102	140	115	112	111	113	110	109	130	123
Per caput production														
NEAR EAST (developing countries)	109	109	108	109	110	110	107	106	106	106	107	108	107	104
Near East in Africa	109	112	110	110	108	116	114	110	111	112	112	111	116	115
Libya	96	122	125	121	131	115	110	97	132	129	127	137	119	112
Sudan	105	115	117	132	116	134	133	109	112	115	128	110	127	126
United Arab Republic	112	112	109	104	108	114	112	112	112	113	109	115	116	117
Near East in Asia (developing countries)	107	107	107	108	110	107	102	103	103	103	105	106	104	99
Afghanistan	106	105	99	105	105	106	99	104	103	98	103	104	103	96
Cyprus	112	151	148	180	179	197	198	113	153	150	185	183	202	204
Iran	101	113	111	108	120	113	108	98	107	108	105	115	108	103
Iraq	90	95	92	95	106	101	89	89	95	93	94	107	102	88
Jordan	154	140	94	103	81	89	68	154	138	92	101	78	87	66
Lebanon	131	133	134	145	138	123	120	130	132	133	144	137	121	119
Saudi Arabia	100	103	102	99	94	95	93	100	103	102	99	94	95	93
Syria	123	120	90	104	98	101	87	109	104	77	100	89	95	76
Turkey	112	105	114	113	116	111	112	107	102	110	108	111	108	108
Yemen Arab Rep.	80	78	74	73	69	68	70	79	78	74	73	69	68	70
Yemen, People's Dem. Rep.	96	99	86	85	77	103	83	92	89	89	84	82	95	89

[1] Excluding Israel.

ANNEX TABLE 8D. – NEAR EAST:[1] VOLUME OF IMPORTS OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat and wheat flour (wheat equivalent)	1.85	2.18	2.01	2.61	3.70	3.91	3.47	4.14	3.30	4.47	4.33	4.02	4.64	3.04	3.97
Maize	0.09	0.11	0.07	0.14	0.09	0.15	0.31	0.26	0.50	0.22	0.29	0.30	0.33	0.20	0.21
Rice (milled equivalent)[2]	0.23	0.25	0.19	0.35	0.35	0.41	0.34	0.25	0.35	0.35	0.34	0.33	0.32	0.37	0.34
Sugar (raw equivalent)[3]	0.89	0.88	0.97	1.04	1.10	1.46	1.07	0.85	1.23	1.74	1.41	1.29	1.03	0.86	...
Dates	0.10	0.08	0.11	0.06	0.05	0.05	0.05	0.06	0.06	0.05	0.05	0.05	0.04	0.05	...
Vegetable oils and oilseeds (oil equivalent)[4]	0.06	0.09	0.11	0.14	0.13	0.10	0.23	0.26	0.26	0.18	0.19	0.23	0.21	0.26	...
Sheep, lambs and goats[5]	1.63	0.94	1.13	1.62	1.23	1.53	2.37	2.30	2.84	2.71	3.07	2.63	3.79	2.94	...
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh, chilled or frozen fish	2.5	1.8	3.0	4.5	4.9	5.6	6.5	6.9	8.5	13.7	23.8	21.5	13.6	4.5	1.1
Dried, salted or smoked fish	4.5	6.4	5.2	5.4	4.4	4.0	2.8	2.1	2.9	2.9	8.8	1.9	2.4	3.7	1.0
Fish products and preparations, whether or not in airtight containers	10.9	12.6	6.3	10.1	9.0	10.1	10.9	9.1	9.0	6.9	5.5	5.8	3.8	3.9	5.4
Oils and fats, crude or refined, of aquatic animal origin	0.5	1.8	2.6	2.7	0.5	0.8	0.7	0.6	0.4	0.8	0.9	0.3	0.8	0.7	0.8
	Million metric tons														
FOREST PRODUCTS															
Sawn softwood[6]	0.47	0.58	0.55	0.55	0.67	0.76	0.83	0.84	1.02	1.06	1.24	1.08	0.78	0.86	0.90
All paper and paperboard	0.16	0.18	0.20	0.20	0.24	0.27	0.28	0.28	0.27	0.31	0.37	0.46	0.46	0.46	0.47

[1] Excluding Israel. – [2] Including paddy converted at 65 percent. – [3] Including refined sugar converted at 108.7 percent. – [4] Groundnuts, copra, soybeans, sunflowerseed, castor beans, linseed, cottonseed, olive oil, groundnut oil, coconut oil, palm oil, palm-kernel oil, soybean oil, sunflowerseed oil, linseed oil, castor oil, cottonseed oil. – [5] Million head. – [6] Million cubic metres.

ANNEX TABLE 8E. – NEAR EAST:[1] VOLUME OF EXPORTS OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat and wheat flour (wheat equivalent)	0.42	0.42	0.27	0.42	0.08	0.04	0.29	0.23	0.26	0.09	0.10	0.12	0.25	0.10	0.05
Barley	0.78	0.53	0.58	0.26	0.02	0.16	0.76	0.54	0.29	0.47	0.19	0.07	0.15	0.36	0.30
Rice (milled equivalent)[2]	0.23	0.30	0.39	0.05	0.31	0.23	0.14	0.38	0.54	0.37	0.36	0.44	0.58	0.78	0.66
Potatoes	0.12	0.12	0.10	0.18	0.24	0.14	0.24	0.20	0.19	0.18	0.23	0.24	0.21	0.25	0.30
Pulses (dry)	0.21	0.14	0.09	0.10	0.08	0.09	0.18	0.18	0.20	0.31	0.14	0.18	0.12	0.13	0.11
Citrus fruit[3]	0.10	0.10	0.12	0.13	0.16	0.15	0.16	0.18	0.19	0.23	0.27	0.27	0.33	0.41	0.42
Dates	0.30	0.27	0.27	0.31	0.29	0.22	0.26	0.37	0.31	0.30	0.32	0.30	0.28	0.33	0.39
Oilseed cake and meal	0.29	0.24	0.31	0.31	0.29	0.34	0.42	0.49	0.54	0.64	0.67	0.62	0.69	0.69	0.72
Sheep, lambs and goats[4]	0.95	0.23	0.47	0.69	0.71	0.90	1.32	1.25	1.15	1.43	1.26	1.08	1.32	1.16	1.15
Cotton (lint)	0.51	0.55	0.54	0.76	0.72	0.66	0.70	0.84	0.80	0.83	1.00	0.90	0.87	0.81	1.02
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh, chilled or frozen fish	25.8	25.6	10.4	7.6	13.1	10.7	8.9	9.5	10.9	14.7	13.5	9.8	12.6	7.0	4.2
Dried, salted or smoked fish	11.7	7.9	5.5	5.3	8.2	7.7	4.7	6.2	6.7	8.3	9.9	10.0	6.6	5.6	7.3
Crustacea and molluscs, fresh, frozen, dried, salted, etc.	0.6	0.5	0.4	0.9	1.3	2.8	5.1	4.0	3.5	3.6	2.8	4.6	2.6	3.2	1.0
Fish products and preparations, whether or not in airtight containers	0.9	1.2	2.3	1.1	0.6	0.6	0.6	0.6	0.3	0.4	0.7	0.4	0.3	—	0.3

[1] Excluding Israel. – [2] Including paddy converted at 65 percent. – [3] Oranges, mandarines and lemons. – [4] Million head.

ANNEX TABLE 8F. – NEAR EAST:[1] INDICES OF VOLUME AND VALUE OF EXPORTS AND IMPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS, BY COMMODITY GROUPS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	1957-59 average = 100														
Export volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	91	99	89	111	109	106	119	124	123	132	142	136	135	135	151
Agricultural products	91	99	89	111	109	106	119	125	123	132	143	136	136	136	152
Food and feed	112	109	98	93	105	104	139	136	137	151	125	128	143	167	149
Beverages and tobacco	86	126	82	92	81	117	119	68	80	96	113	129	119	110	117
Raw materials	83	89	87	124	117	105	110	132	127	132	156	141	137	128	160
Fishery products	130	125	100	75	95	98	94	89	85	102	113	107	83	63	50
Forest products	144	97	119	84	124	149	164	168	184	232	270	175	135	166	160
Export value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	101	110	91	99	103	96	102	113	114	123	127	124	129	135	138
Agricultural products	101	110	91	99	102	96	101	113	114	123	127	123	129	135	138
Food and feed	120	111	98	92	98	97	135	140	143	156	145	149	170	193	168
Beverages and tobacco	89	133	82	85	62	79	86	67	84	85	97	114	96	87	83
Raw materials	95	105	90	105	113	99	91	111	107	117	125	114	119	120	137
Fishery products	117	111	97	92	108	116	113	115	129	152	161	183	151	157	106
Forest products	152	98	118	84	132	156	176	196	200	248	295	191	148	197	191
Import volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	85	96	94	110	123	135	136	139	147	166	171	171	170	154	...
Agricultural products	86	95	94	111	124	137	138	141	149	169	171	174	173	155	...
Food and feed	87	96	92	112	130	145	145	149	159	183	175	180	178	155	...
Beverages and tobacco	85	97	99	104	100	109	108	110	114	117	148	135	133	130	...
Raw materials	69	84	96	120	147	144	185	172	174	215	217	267	292	293	...
Fishery products	95	110	78	111	96	108	113	104	112	131	200	177	123	71	...
Forest products	83	101	99	100	116	122	118	118	135	143	166	152	149	151	158
Import value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	87	104	92	104	114	125	123	135	157	163	169	160	157	141	...
Agricultural products	87	104	92	104	114	125	124	138	160	165	169	161	158	139	...
Food and feed	87	105	89	106	119	133	132	152	178	181	181	174	173	144	...
Beverages and tobacco	91	104	96	99	95	94	88	88	96	103	128	108	98	102	...
Raw materials	72	94	99	107	144	167	197	181	186	213	197	221	221	251	...
Fishery products	79	112	83	105	109	110	113	103	113	128	142	140	113	48	...
Forest products	86	106	98	97	115	121	112	113	135	147	170	154	153	166	180

[1] Excluding Israel.

ANNEX TABLE 8G. – NEAR EAST: ESTIMATED CALORIE AND PROTEIN CONTENT OF NATIONAL AVERAGE FOOD SUPPLY PER CAPUT

	Calories			Total protein			Animal protein		
	1960-1962	1964-1966	1969	1960-1962	1964-1966	1969	1960-1962	1964-1966	1969
	Number per day			*Grammes per day*					
Afghanistan	...	2 060	...	...	65.4	...	...	7.8	...
Iran	...	2 030	...	...	55.2	...	...	11.7	...
Iraq	...	2 050	...	...	57.8	...	...	13.6	...
Israel [1]	2 820	[2] 2 830	[3] 2 930	84.5	[2] 86.3	[3] 89.7	36.0	[2] 39.7	[3] 43.1
Jordan	2 220	2 400	...	61.5	64.8	...	9.9	11.3	...
Lebanon	2 160	2 360	...	61.2	69.9	...	18.0	20.4	...
Libya	1 730	[4] 1 830	2 540	47.2	[4] 48.7	63.9	9.3	[4] 10.2	17.8
Saudi Arabia	...	2 080	...	...	56.2	...	...	9.5	...
Sudan, The	...	2 090	...	...	58.9	...	...	18.7	...
Syria	...	2 450	...	...	69.2	...	...	11.7	...
Turkey [1]	...	2 760	...	...	77.9	...	...	14.8	...
United Arab Republic [1]	2 690	[2] 2 870	[5] 2 960	77.3	[2] 82.6	[5] 76.3	10.7	[2] 11.1	[5] 10.7

[1] Split years. – [2] 1963/-65/. – [3] 1968/-69/. – [4] 1963-65. – [5] 1966/67.

ANNEX TABLE 9A. – AFRICA: BASIC DATA ON NATIONAL AGRICULTURE

	Period	Population in agriculture		Agricultural GDP			Share of agriculture in value of total trade		Arable land per person in agriculture	Fertilizer consumption per hectare of arable land
							Exports	Imports		
		Thousands	*Percent of total*	*Million dollars*	*Percent of total*	*Dollars per caput*	..... *Percent*		*Hectares per caput*	*Kilogrammes per hectare*
Algeria	1950	[1]6 010	71	672	34	112	...	...	0.97	6
	1960	...	...	[2]678	21	...	...	...	...	8
	1965	7 150	60	[3]449	17	63	...	...	0.95	6
	1968	7 428	57	...	...	...	...	...	0.91	8
Cameroon	1960	...	...	[4]245	48	...	...	...	...	...
	1965	4 368	84	295	47	52	81	15	...	...
	1967	4 631	83	389	51	84	95	13	1.58	2
Congo, Dem. Rep. of the	1950	[5]9 084	84	...	37	...	[6]51	[6]9	5.39	—
	1960	...	...	...	33	...	...	...	...	—
	1965	10 945	70	[3]237	26	22	...	...	...	—
	1968	11 501	69	242	21	21	60	15	6.26	1
Ethiopia	1960	[8]18 900	90	[7]694	68	37	...	...	[8]0.61	—
	1965	20 120	89	791	62	40	98	8	0.62	—
	1967	20 970	87	809	58	39	99	10	0.61	—
Gabon	1960	[7]230	74	35	27	154	...	...	0.55	—
	1965	388	84	44	26	113	46	16	...	—
	1967	392	82	47	[9]22	120	34	16	0.32	...
Ghana	1960	3 944	58	767	51	194	75	19	1.35	—
	1965	4 642	60	[3]891	51	192	85	13	0.55	2
	1968	4 895	58	691	37	141	96	18	0.58	1
Ivory Coast	1960	...	...	247	50	...	...	...	...	...
	1965	3 105	81	338	42	109	94	19	0.66	6
	1967	3 920	85	380	[9]41	97	92	18	2.26	1
Kenya	1960	...	...	252	40	...	78	8	...	6
	1965	7 821	84	316	34	40	74	14	...	...
	1968	8 406	82	422	35	50	58	12	0.20	17
Liberia	1960	[8]810	81	...	40	...	51	17	...	—
	1965	856	80	75	27	88	25	17	4.77	—
	1968	886	78	76	23	86	20	22	4.35	—
Malawi	1950	[10]2 078	92	...	...	...	...	...	1.37	—
	1960	[7]2 765	79	74	58	27	...	...	1.06	1
	1965	3 158	80	88	36	31	92	17	0.40	4
	1968	3 284	77	85	35	26	90	15	0.89	2
Morocco	1950	[11]6 390	71	491	32	...	...	...	1.24	2
	1960	6 496	56	518	32	80	...	...	1.32	5
	1965	7 295	55	633	33	87	55	42	1.08	6
	1968	7 533	52	970	35	129	57	32	1.05	12
Nigeria	1950	...	...	961	67	...	[6]89	[6]11	...	—
	1960	...	...	1 979	63	...	89	14	...	—
	1965	46 196	79	2 372	55	51	66	10	...	...
	1966	49 016	77	2 517	56	51	57	11	0.45	1
Rhodesia	1960	...	...	142	18	...	...	...	...	30
	1965	3 195	75	188	19	59	44	14	...	...
	1968	3 548	72	150	16	42	...	...	0.52	47
Senegal	1960	...	...	[1, 6]231	34	...	...	...	...	1
	1965	2 605	75	235	33	90	88	41	...	...
	1968	2 709	74	218	30	80	83	42	2.11	2
South Africa	1950	2 687	22	642	18	239	...	...	2.57	18
	1960	6 995	44	835	12	119	42	10	1.72	18
	1965	5 200	29	1 052	10	202	40	9	...	...
	1968	5 360	27	1 350	10	250	39	8	2.16	41
Tanzania	1960	...	...	316	61	...	83	8	...	...
	1965	10 932	95	370	54	34	83	9	1.09	1
	1968	11 776	94	411	50	35	74	11	1.00	1

ANNEX TABLE 9A. – AFRICA: BASIC DATA OF NATIONAL AGRICULTURE (*concluded*)

	Period	Population in agriculture		Agricultural GDP			Share of agriculture in value of total trade		Arable land per person in agriculture	Fertilizer consumption per hectare of arable land
							Exports	Imports		
		Thousands	*Percent of total*	*Million dollars*	*Percent of total*	*Dollars per caput*	..... *Percent*		*Hectares per caput*	*Kilogrammes per hectare*
Togo	1960	[12]1 308	91	...	...	...	...	...	1.65	...
	1965	1 295	79	81	50	62	62	18	1.67	...
	1966	1 365	77	94	47	69	53	23	1.58	...
Tunisia	1960	...	...	169	25	...	...	...	...	3
	1965	2 630	60	187	23	71	51	21	1.65	5
	1968	2 778	58	159	17	57	38	28	1.62	6
Uganda	1960	[5]5 829	87	260	61	45	88	6	[4]0.51	1
	1965	6 870	91	369	59	54	85	8	0.55	1
	1968	7 239	89	405	[13]58	56	83	10	0.67	1
Zambia	1950	1 423	77	...	...	...	...	...	...	...
	1960	...	...	56	11	...	...	...	...	5
	1965	3 005	81	154	10	51	3	11	...	...
	1968	3 177	78	101	9	32	1	10	1.51	4

[1] 1948. – [2] 1958. – [3] 1964. – [4] 1959. – [5] 1947. – [6] 1951. – [7] 1961. – [8] 1962. – [9] 1966. – [10] 1949. – [11] Average 1952-1954. – [12] 1958/60. – [13] 1967.

ANNEX TABLE 9B. – AFRICA:[1] VOLUME OF PRODUCTION OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat	3.88	3.35	3.69	3.39	4.05	2.46	4.24	4.56	3.97	4.46	3.01	3.97	5.62	4.23	4.94
Barley	3.84	2.48	3.59	3.03	3.60	2.12	3.66	4.06	3.18	3.38	2.24	3.17	5.40	4.13	3.96
Maize	7.15	7.39	7.56	8.39	8.61	8.07	8.85	9.08	9.11	9.11	11.12	10.88	11.00	11.48	10.63
Millet and sorghum	7.46	7.22	8.30	8.40	8.63	9.06	10.10	10.63	11.13	10.76	10.69	10.91	9.76	10.81	10.48
Rice (milled equivalent) [2]	1.84	2.11	2.06	2.11	2.26	2.11	2.28	2.32	2.48	2.35	2.51	2.94	2.85	3.16	3.11
Sugar (centrifugal)	1.18	1.26	1.19	1.37	1.12	1.51	1.53	1.86	1.74	2.02	2.11	2.21	2.29	2.55	2.53
Pulses [3]	1.41	1.33	1.40	1.48	1.53	1.39	1.52	1.66	1.64	1.76	1.71	1.71	1.92	2.09	1.98
Citrus fruit	0.95	1.02	1.07	1.14	1.24	1.26	1.28	1.32	1.53	1.40	1.53	1.59	1.76	1.75	1.89
Bananas	0.81	0.87	0.85	0.93	0.89	0.88	0.97	1.00	1.01	1.05	1.02	1.09	1.07	1.09	1.09
Olive oil	0.16	0.08	0.18	0.08	0.19	0.08	0.09	0.15	0.14	0.12	0.06	0.10	0.13	0.07	0.14
Groundnuts	3.15	3.88	3.37	3.18	3.72	3.93	4.39	4.38	4.16	5.06	5.02	4.53	4.37	4.37	3.57
Total vegetable oils and oilseeds (oil equivalent) [4]	2.90	3.01	2.97	2.83	3.11	3.02	3.16	3.25	3.20	3.43	3.33	3.00	3.11	3.25	3.06
Coffee	0.48	0.53	0.63	0.69	0.84	0.74	0.96	1.03	1.08	1.19	1.03	1.28	1.16	1.31	1.31
Cocoa	0.59	0.45	0.57	0.66	0.87	0.83	0.85	0.90	1.20	0.86	0.97	0.98	0.84	1.01	1.08
Wine	2.22	1.88	1.79	2.30	1.97	1.73	1.60	1.72	1.48	1.93	1.02	0.88	1.27	1.03	0.98
Tobacco	0.14	0.14	0.14	0.16	0.18	0.18	0.18	0.16	0.22	0.22	0.21	0.18	0.16	0.16	0.17
Cotton	0.27	0.29	0.31	0.29	0.31	0.25	0.30	0.33	0.35	0.36	0.42	0.42	0.45	0.55	0.56
Sisal	0.31	0.32	0.35	0.37	0.36	0.37	0.40	0.41	0.43	0.41	0.41	0.39	0.37	0.38	0.37
Rubber (natural)	0.12	0.12	0.13	0.14	0.15	0.14	0.15	0.15	0.16	0.16	0.18	0.17	0.18	0.19	0.21
Wool (greasy)	0.04	0.04	0.04	0.04	0.04	0.03	0.04	0.04	0.03	0.04	0.04	0.04	0.05	0.05	0.05
Milk (total)	4.83	4.91	4.94	5.10	5.24	5.21	5.10	5.23	5.38	5.58	5.79	5.96	6.17	6.44	6.53
Meat [5]	2.14	2.18	2.22	2.23	2.32	2.39	2.40	2.37	2.37	2.47	2.60	2.65	2.73	2.78	2.85
Eggs	0.21	0.22	0.23	0.24	0.25	0.26	0.26	0.27	0.29	0.30	0.31	0.32	0.32	0.33	0.34
FISHERY PRODUCTS [6]	...	...	...	...	1.34	1.38	1.47	1.50	1.75	1.80	2.03	2.08	2.11	2.31	2.49
FOREST PRODUCTS															
Fuelwood [7]	153.0	153.8	154.6	158.4	164.0	167.2	168.7	187.6	189.6	194.7	199.7	204.7	208.4	212.0	215.0
Industrial roundwood [7]	13.8	14.8	16.8	17.8	18.5	18.3	18.5	19.6	20.6	21.6	22.1	23.1	24.1	25.2	25.3
Sawn softwood [7]	0.23	0.19	0.19	0.20	0.24	0.23	0.25	0.23	0.25	0.27	0.27	0.30	0.27	0.28	0.30
Sawn hardwood [7]	1.4	1.4	1.6	1.6	1.6	1.8	1.7	1.7	1.8	2.0	2.0	2.0	2.2	2.4	2.4
Plywood [7]	0.07	0.08	0.09	0.10	0.10	0.11	0.14	0.17	0.18	0.20	0.16	0.17	0.18	0.19	0.20
All paper and paperboard	0.08	0.07	0.08	0.09	0.09	0.10	0.08	0.09	0.10	0.10	0.10	0.13	0.13	0.13	0.14

[1] Excluding South Africa. – [2] Paddy converted at 65 percent. – [3] Dry beans, dry peas, broad beans, chick-peas, lentils. – [4] Olive oil, palm oil, soybeans, groundnuts, cottonseed, sesame seed, sunflowerseed, rapeseed, copra, palm kernels, linseed, hempseed, castor beans. – [5] Beef and veal, mutton and lamb, pork, poultry meat. – [6] Nominal catch (liveweight). – [7] Million cubic metres.

ANNEX TABLE 9C. – AFRICA:[1] INDICES OF FOOD AND TOTAL AGRICULTURAL PRODUCTION

	Total agricultural production							Food production						
	1964	1965	1966	1967	1968	1969	1970 (Preliminary)	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
Total production	*1952-56 average = 100*													
AFRICA (developing countries, excl. Near East in Africa)	132	134	134	138	142	147	148	127	128	128	132	137	140	141
Northwestern Africa	100	108	87	100	130	109	118	102	109	87	100	131	109	119
Algeria	77	89	68	82	97	88	94	79	91	68	83	98	89	94
Morocco	120	130	108	122	174	138	146	122	132	108	123	178	140	148
Tunisia	121	116	100	102	113	99	129	121	116	98	102	112	97	129
Western Africa	151	150	150	150	144	155	157	148	145	148	145	140	149	150
Dahomey	115	115	117	119	127	130	139	115	114	116	116	120	123	129
Gambia	154	178	189	166	185	203	150	154	178	189	166	185	203	150
Ghana	189	164	170	180	167	182	191	188	164	168	179	166	181	190
Guinea	126	123	122	126	130	136	143	127	123	125	127	130	136	141
Ivory Coast	194	210	183	238	218	249	239	170	163	179	189	190	206	207
Liberia	119	125	126	134	139	142	152	117	119	114	115	117	117	118
Mali	120	122	126	133	127	135	130	116	120	122	127	119	127	121
Mauritania	136	139	138	138	141	141	142	136	139	138	138	141	141	142
Niger	166	161	169	186	176	190	179	165	159	168	184	174	188	177
Nigeria	140	140	143	128	125	134	141	139	138	141	127	124	132	137
Senegal	164	181	159	186	153	172	136	164	180	158	186	152	170	133
Sierra Leone	128	133	137	139	141	137	146	125	129	136	136	138	135	141
Togo	185	188	191	208	220	226	224	180	181	194	204	213	219	215
Upper Volta	204	210	201	197	200	217	166	204	210	196	194	192	209	194
Central Africa	122	124	129	132	139	145	144	112	113	117	119	125	130	131
Angola	163	170	178	182	177	187	192	123	127	128	131	134	138	142
Cameroon	162	162	162	187	192	197	192	149	138	139	159	163	164	164
Central African Rep.	132	136	142	152	159	160	155	140	140	142	150	153	152	156
Chad	118	117	123	115	131	119	118	112	113	113	107	116	111	114
Congo, People's Rep. of the	133	119	125	136	131	139	140	134	117	120	137	128	136	138
Congo, Dem. Rep. of the	93	97	103	100	109	119	119	92	97	103	99	108	117	117
Gabon	148	150	156	162	169	170	178	144	146	152	158	165	166	174
Eastern Africa	134	137	144	147	149	159	157	125	128	136	139	142	150	147
Burundi	117	119	122	124	127	140	151	114	118	120	120	124	138	147
Ethiopia	135	136	140	147	152	153	156	125	128	131	134	138	139	142
Kenya	134	133	145	148	155	162	167	123	123	130	137	145	147	150
Madagascar	124	124	127	146	149	180	154	122	120	126	143	146	189	154
Malawi	149	173	195	202	176	189	180	154	170	205	216	185	201	176
Mauritius	99	127	111	125	119	130	116	100	126	109	122	116	127	112
Mozambique	134	129	137	142	157	155	161	132	130	132	138	156	150	154
Rhodesia	183	185	187	175	151	175	164	151	160	174	169	162	180	163
Rwanda	91	102	111	125	132	138	143	89	99	110	122	129	135	139
Somalia	112	114	115	120	115	118	117	111	114	115	120	115	117	116
Tanzania	139	140	162	155	153	163	164	132	130	151	145	147	153	152
Uganda	141	147	144	144	150	164	161	127	129	133	136	142	146	146
Zambia	147	155	194	185	159	173	157	135	150	194	190	158	174	158
Southern Africa (developing countries)	115	119	129	130	136	138	138	120	123	136	138	140	144	144
Botswana	100	103	129	119	103	133	127	100	103	129	119	103	133	127
Lesotho	105	107	110	109	119	112	108	104	107	109	109	115	106	102

ANNEX TABLE 9C. – AFRICA:[1] INDICES OF FOOD AND TOTAL AGRICULTURAL PRODUCTION (*concluded*)

	Total agricultural production							Food production						
	1964	1965	1966	1967	1968	1969	1970 (Preliminary)	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	1952-56 average = 100													
Per caput production														
AFRICA (developing countries, excl. Near East in Africa)	104	103	100	101	101	102	100	100	99	96	97	97	97	95
Northwestern Africa	80	84	66	74	93	76	79	81	85	66	74	94	76	80
Algeria	62	70	53	62	71	63	65	64	72	53	62	71	63	65
Morocco	91	96	78	85	117	90	93	93	98	78	86	120	91	94
Tunisia	105	99	83	83	90	76	93	106	99	82	83	89	75	93
Western Africa	115	111	108	105	99	103	102	113	108	107	102	96	99	97
Dahomey	87	84	84	83	86	85	89	87	83	82	81	81	81	82
Gambia	131	148	155	133	145	156	113	131	148	155	133	145	156	113
Ghana	145	123	124	128	115	123	125	144	122	122	127	114	122	114
Guinea	92	88	85	85	86	88	90	93	88	87	86	86	88	89
Ivory Coast	140	146	124	156	138	153	142	122	113	121	124	121	127	123
Liberia	102	105	105	109	111	112	118	100	100	94	93	94	92	91
Mali	99	99	100	104	97	101	96	96	98	97	99	91	95	89
Mauritania	116	117	115	112	111	109	108	116	117	115	112	111	109	108
Niger	129	121	124	133	122	129	118	128	120	124	132	122	127	117
Nigeria	104	101	100	87	82	85	87	103	99	99	86	82	84	85
Senegal	131	141	21	140	112	123	96	131	140	120	139	111	122	94
Sierra Leone	115	118	120	119	119	114	120	112	114	118	117	117	113	116
Togo	148	147	145	154	159	159	154	144	141	147	151	154	154	148
Upper Volta	174	176	165	158	157	167	150	174	175	160	155	151	160	146
Central Africa	101	101	103	103	106	109	106	93	92	93	93	96	97	96
Angola	141	145	149	151	145	151	150	106	108	107	108	110	111	111
Cameroon	134	131	127	144	145	146	139	123	111	109	123	124	121	119
Central African Republic	112	112	115	120	123	121	115	118	115	115	119	118	115	115
Chad	102	99	103	95	107	95	93	97	96	95	89	94	89	90
Congo. People's Rep. of the	113	99	103	111	106	111	111	114	98	99	112	104	109	108
Congo. Dem. Rep. of the	75	76	79	75	80	86	84	74	77	79	75	79	85	82
Gabon	137	137	141	145	149	149	153	133	133	138	142	146	145	150
Eastern Africa	107	107	110	110	108	113	108	100	100	104	104	103	107	101
Burundi	96	96	96	96	96	104	110	93	94	94	93	94	102	107
Ethiopia	114	112	114	117	118	116	116	106	106	107	106	107	105	105
Kenya	100	96	102	101	103	105	105	92	89	92	93	96	95	94
Madagascar	97	95	95	107	106	126	105	96	92	94	105	105	132	105
Malawi	118	133	145	146	124	129	119	122	131	153	156	130	137	117
Mauritius	74	92	79	87	81	87	77	74	92	77	85	79	85	74
Mozambique	117	111	117	121	130	127	130	116	112	113	117	129	123	124
Rhodesia	135	132	130	117	98	110	99	111	115	121	113	105	113	99
Rwanda	67	73	77	84	86	88	88	66	71	76	83	84	86	86
Somalia	90	90	89	90	85	85	82	90	90	88	90	85	85	82
Tanzania	110	108	122	114	109	113	111	104	100	113	106	105	107	103
Uganda	110	112	107	104	106	113	108	99	98	99	99	100	101	98
Zambia	111	113	138	128	106	111	98	102	110	138	131	105	112	99
Southern Africa (developing countries)	87	88	93	91	92	91	89	91	91	98	97	95	95	93
Botswana	75	75	91	82	69	86	80	75	75	91	82	69	86	80
Lesotho	80	80	79	77	81	74	69	79	79	79	76	78	70	65

[1] Excluding South Africa.

ANNEX TABLE 9D. – AFRICA:[1] VOLUME OF IMPORTS OF MAJOR AGRICULTURAL FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat and wheat flour (wheat equivalent)	0.83	0.94	0.79	1.29	1.57	1.91	1.89	1.47	1.09	1.71	2.06	2.97	2.74	2.05	2.50
Barley	0.07	0.02	—	—	0.01	0.37	0.24	0.06	0.07	0.08	0.09	0.12	0.05	0.07	0.02
Rice (milled equivalent)[2]	0.32	0.42	0.34	0.49	0.45	0.47	0.56	0.49	0.60	0.65	0.70	0.58	0.59	0.55	0.55
Sugar (raw equivalent)[3]	0.95	1.00	1.01	1.08	1.12	1.10	1.22	0.98	1.03	1.14	1.20	1.25	1.15	1.00	...
Potatoes	0.26	0.27	0.29	0.26	0.31	0.34	0.24	0.20	0.19	0.16	0.16	0.12	0.16	0.15	...
Cattle[4]	0.21	0.21	0.22	0.23	0.27	0.29	0.27	0.30	0.25	0.21	0.26	0.19	0.22	0.25	...
Sheep, lambs and goats[4]	0.32	0.28	0.25	0.33	0.38	0.25	0.40	0.60	0.40	0.19	0.24	0.24	0.26	0.28	...
Wine	0.33	0.25	0.20	0.22	0.26	0.30	0.22	0.22	0.22	0.26	0.27	0.25	0.26	0.24	...
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh, chilled or frozen fish	24.3	25.2	28.2	29.8	37.3	55.0	55.7	72.8	62.8	65.9	81.6	58.1	71.6	82.1	84.0
Dried, salted or smoked fish	93.3	100.2	94.6	95.7	99.5	99.7	97.0	101.0	91.8	85.8	97.3	86.6	71.4	67.4	71.0
Crustacea and molluscs, fresh, frozen, dried, salted, etc.	2.6	3.4	3.4	3.3	4.1	3.9	1.9	1.2	2.1	0.7	0.8	0.7	1.5	0.5	0.5
Fish products and preparations, whether or not in airtight containers	33.0	35.4	31.9	38.1	40.2	39.5	31.3	31.1	29.6	33.8	32.8	26.4	29.4	29.7	27.5
Oils and fats, crude or refined, of aquatic animal origin	0.5	0.2	0.4	0.5	0.7	1.0	1.9	1.7	2.3	1.7	0.8	0.8	1.7	2.0	2.0
Meals, solubles and similar animal feedstuffs of aquatic animal origin	5.9	6.8	6.6	6.6	6.0	7.9	7.6	8.7	6.2	9.4	10.1	11.5	11.0	17.0	18.0
	Million metric tons														
FOREST PRODUCTS															
Sawn softwood[5]	0.54	0.53	0.63	0.64	0.71	0.50	0.44	0.44	0.55	0.48	0.54	0.57	0.63	0.68	0.70
Sawn hardwood[5]	0.14	0.16	0.15	0.14	0.15	0.12	0.12	0.13	0.12	0.17	0.19	0.17	0.18	0.18	0.18
Newsprint	0.03	0.03	0.03	0.04	0.05	0.05	0.05	0.05	0.03	0.04	0.05	0.04	0.03	0.03	0.03
Other paper and paperboard	0.10	0.12	0.14	0.12	0.14	0.15	0.15	0.18	0.19	0.23	0.24	0.26	0.34	0.37	0.41

[1] Excluding South Africa. – [2] Including paddy converted at 65 percent. – [3] Including refined sugar converted at 108.7 percent. – [4] Million head. – [5] Million cubic metres.

ANNEX TABLE 9E. – AFRICA:[1] VOLUME OF EXPORTS OF MAJOR AGRICULTURAL, FISHERY AND FOREST PRODUCTS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	Million metric tons														
AGRICULTURAL PRODUCTS															
Wheat and wheat flour (wheat equivalent)[2]	0.36	0.30	0.38	0.27	0.36	0.13	0.15	0.21	0.19	0.15	0.19	0.10	0.10	0.10	0.13
Barley	0.48	0.10	0.25	0.25	0.16	0.04	—	0.28	0.35	0.02	0.07	0.01	0.01	0.14	0.13
Maize	0.45	0.37	0.48	0.42	0.30	0.46	0.62	0.43	0.22	0.29	0.25	0.56	0.74	0.38	0.31
Sugar (raw equivalent)[3]	0.89	1.00	0.94	0.87	0.73	0.90	0.98	1.07	1.08	1.20	1.14	1.24	1.35	1.35	1.39
Bananas	0.35	0.40	0.39	0.37	0.38	0.43	0.43	0.45	0.44	0.43	0.38	0.38	0.37	0.38	0.40
Citrus fruit[4]	0.37	0.55	0.51	0.53	0.60	0.61	0.64	0.67	0.75	0.66	0.65	0.69	0.72	0.78	0.82
Pulses (dry)	0.23	0.14	0.16	0.21	0.29	0.21	0.27	0.31	0.36	0.30	0.28	0.26	0.40	0.37	0.37
Groundnuts and oil (oil equivalent)	0.56	0.52	0.67	0.62	0.53	0.67	0.64	0.71	0.71	0.70	0.82	0.75	0.89	0.66	0.58
Palm kernels and oil (oil equivalent)	0.39	0.36	0.40	0.40	0.38	0.36	0.32	0.32	0.33	0.33	0.34	0.24	0.26	0.26	0.28
Palm oil	0.38	0.36	0.37	0.40	0.39	0.36	0.31	0.31	0.31	0.28	0.27	0.18	0.20	0.18	0.20
Oilseed cake and meal	0.41	0.42	0.50	0.53	0.53	0.57	0.52	0.52	0.84	0.67	0.72	0.82	0.85	0.83	0.80
Cattle[5]	0.22	0.19	0.20	0.17	0.25	0.24	0.35	0.37	0.41	0.37	0.36	0.34	0.28	0.28	0.29
Sheep, lambs and goats[5]	0.67	0.73	0.79	1.00	0.85	1.10	1.42	1.29	1.69	1.36	1.64	1.51	1.76	1.24	1.67
Coffee (green)	0.52	0.53	0.54	0.59	0.66	0.67	0.76	0.78	0.85	0.85	0.92	0.91	0.99	0.98	1.00
Cocoa beans	0.52	0.57	0.44	0.56	0.65	0.80	0.86	0.83	0.84	1.08	0.88	0.83	0.82	0.76	0.81
Wine	1.52	1.89	1.50	1.62	1.74	1.60	1.78	1.04	1.29	1.08	1.17	0.72	0.84	0.97	1.90
Tobacco (unmanufactured)	0.09	0.07	0.08	0.09	0.10	0.11	0.11	0.11	0.14	0.16	0.10	0.11	0.10	0.10	0.10
Cotton (lint)	0.26	0.24	0.27	0.29	0.27	0.27	0.28	0.28	0.28	0.28	0.31	0.33	0.31	0.32	0.39
Sisal	0.30	0.32	0.34	0.36	0.37	0.36	0.41	0.40	0.39	0.36	0.34	0.34	0.34	0.31	0.36
Rubber (natural)	0.12	0.12	0.13	0.14	0.15	0.14	0.15	0.15	0.14	0.15	0.16	0.15	0.15	0.17	0.20
	Thousand metric tons														
FISHERY PRODUCTS															
Fresh, chilled or frozen fish	11.5	14.6	14.0	15.9	18.0	20.4	36.2	33.5	17.8	17.2	19.2	14.7	17.9	17.0	28.0
Dried, salted or smoked fish	43.6	45.9	49.3	46.5	44.7	50.2	38.3	36.8	33.7	42.3	38.7	37.0	40.9	37.0	36.7
Crustacea and molluses, fresh, frozen, dried, salted, etc.	1.9	2.6	1.9	2.5	2.4	2.4	2.9	2.9	3.5	3.8	3.3	4.8	6.2	7.4	7.8
Fish produets and preparations, whether or not in airtight containers	31.2	36.9	37.9	45.4	51.9	32.3	59.4	56.3	63.0	37.6	56.7	52.9	62.0	60.2	71.9
Oils and fats, erude or refined, of aquatie animal origin	6.2	14.7	13.2	9.0	11.7	7.0	7.6	8.3	12.7	6.5	11.1	13.5	15.1	16.8	15.8
Meals, solubles and similar animal feedstuffs of aquatie animal origin	60.6	107.0	98.6	67.1	60.3	70.7	49.6	49.0	77.1	77.2	92.8	63.8	84.1	121.5	86.2
	Million cubic metres														
FOREST PRODUCTS															
Broadleaved logs	2.64	3.00	3.38	3.92	4.60	4.45	4.13	4.80	5.65	5.24	5.14	5.20	6.00	7.55	7.00
Sawn hardwood	0.40	0.45	0.55	0.55	0.59	0.56	0.57	0.57	0.70	0.72	0.75	0.70	0.75	0.73	0.74

[1] Excluding South Africa. – [2] Including coarse ground flour. – [3] Ineluding refined sugar eonverted at 108.7 pereent. – [4] Oranges, mandarines and lemons. – [5] Million head.

ANNEX TABLE 9F. – AFRICA:[1] INDICES OF VOLUME AND VALUE OF EXPORTS AND IMPORTS OF AGRICULTURAL, FISHERY AND FOREST PRODUCTS, BY COMMODITY GROUPS

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 (Preliminary)
	1957-59 average = 100														
Export volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	95	97	98	105	109	115	119	120	129	132	130	132	131	129	139
Agricultural products	96	98	97	105	108	114	119	118	126	130	128	120	128	124	135
Food and feed	95	93	104	103	95	101	103	108	113	106	110	102	116	105	104
Beverages and tobacco	97	103	92	105	118	127	139	129	141	154	144	135	141	140	157
Raw materials	94	92	100	108	106	104	93	108	108	106	114	115	111	114	136
Fishery products	88	101	100	99	105	112	127	122	119	100	119	107	128	134	149
Forest products	77	88	101	111	124	123	122	143	174	170	171	168	192	214	207
Sawlogs	77	87	98	114	134	130	120	140	165	153	150	151	175	220	204
Export value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	94	96	104	100	102	102	101	110	124	118	118	113	122	126	144
Agricultural products	95	96	104	100	100	100	99	107	119	113	113	108	116	117	138
Food and feed	101	98	103	99	95	99	100	113	116	116	116	105	115	108	111
Beverages and tobacco	89	95	106	99	100	98	99	98	122	113	113	113	123	129	163
Raw materials	103	96	98	105	116	108	96	123	120	104	104	98	89	101	115
Fishery products	96	106	99	95	97	108	109	103	113	102	125	116	129	147	155
Forest products	78	86	102	112	132	137	135	170	205	198	194	192	221	259	242
Sawlogs	79	85	99	116	147	150	138	182	214	193	187	194	228	290	255
Import volume															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	94	99	94	107	116	125	121	110	112	125	131	141	141	133	...
Agricultural products	96	100	95	105	119	131	128	112	116	131	136	151	151	140	...
Food and feed	91	98	94	108	122	134	136	115	114	134	139	153	151	140	...
Beverages and tobacco	115	105	99	97	106	118	99	99	112	114	117	131	131	125	...
Raw materials	93	104	113	84	127	131	135	138	233	232	253	309	392	322	...
Fishery products	95	101	97	102	109	115	107	115	106	105	117	100	98	100	...
Forest products	78	82	88	130	99	84	72	74	81	86	95	94	99	106	108
Pulp and paper	97	101	86	113	124	126	126	126	105	122	151	111	111	118	116
Import value															
AGRICULTURAL, FISHERY AND FOREST PRODUCTS	94	102	95	103	109	115	109	101	112	124	125	131	130	122	...
Agricultural products	97	103	97	99	112	120	114	105	118	131	129	140	137	126	...
Food and feed	96	103	95	102	116	125	121	109	120	136	133	142	137	126	...
Beverages and tobacco	101	102	108	90	94	97	88	86	101	105	104	117	120	114	...
Raw materials	104	112	110	78	138	144	140	145	221	224	237	290	354	295	...
Fishery products	77	106	84	109	97	100	92	91	90	93	111	91	85	88	...
Forest products	83	86	87	127	99	84	71	73	84	91	101	97	104	119	124
Pulp and paper	96	103	86	111	122	123	123	122	103	119	148	110	109	118	123

[1] Excluding South Africa.

ANNEX TABLE 9G. – AFRICA: ESTIMATED CALORIE AND PROTEIN CONTENT OF NATIONAL AVERAGE FOOD SUPPLY PER CAPUT

	Calories			Total protein			Animal protein		
	1960-1962	1964-1966	1969	1960-1962	1964-1966	1969	1960-1962	1964-1966	1969
	Number per day			*Grammes per day*					
Algeria	...	1 890	...	...	55.7	...	...	6.6	...
Cameroon	...	2 230	...	...	58.9	...	...	10.8	...
Ethiopia	...	2 150	...	...	72.3	...	...	10.8	...
Gabon	...	2 180	...	...	51.0	...	...	27.2	...
Gambia, The	...	2 320	...	...	62.2	...	...	14.6	...
Ghana	...	2 070	...	...	43.0	...	...	7.3	...
Ivory Coast	...	2 430	...	...	59.1	...	...	12.9	...
Kenya	...	2 240	...	...	67.9	...	...	13.3	...
Madagascar	...	2 390	...	...	56.1	...	...	12.0	...
Mali	...	2 130	...	...	68.4	...	...	15.0	...
Mauritius	2 330	[1]2 350	2 210	47.2	[1]49.5	45.5	12.3	[1]13.8	11.9
Morocco	...	2 130	...	...	57.7	...	...	10.0	...
Mozambique	...	2 130	...	...	40.4	...	...	4.6	...
Nigeria	...	2 160	...	...	58.6	...	...	5.1	...
Rwanda	...	1 900	...	...	57.0	...	...	3.6	...
Somalia	...	1 770	...	...	56.9	...	...	22.2	...
South Africa	[2]2 820	2 730	...	[2]80.2	77.0	...	[2]31.5	28.3	...
Tanzania	...	2 140	...	...	60.2	...	...	12.4	...
Tunisia	...	2 200	...	...	62.9	...	...	10.9	...
Uganda	...	2 160	...	...	55.9	...	...	15.1	...

[1] 1963-65. – [2] 1960/61.

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