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"Not only additional constraints but also new development possibilities are at the heart of environmental considerations"

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METHODOLOGICAL/INSTITUTIONAL PAPER

THE ENVIRONMENT AND DEVELOPMENT PLANNING: METHODOLOGICAL AND INSTITUTIONAL ASPECTS

BY

OLIVIER GODARD

This paper was prepared by Olivier Godard, Research Economist, Centre International de Recherche sur l'Environnement et le Développement (CIRED), Ecole des Hautes Etudes en Sciences Sociales, Paris. The views expressed in it are those of the author and do not necessarily reflect those of the United Nations or the institution with which the author is associated.

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Contents

ABSTRACT

This paper stresses the environmental dangers that arise in the development process from a heavy reliance on pure market regulation. Environmental degradation (manifested in "intrinsic" and "outer" externalities) is not corrected, and is even aggravated, in a market system if specific forms of intervention, which limit the free play of the market, are not adopted. A market-oriented development pattern, moreover, invokes a time horizon geared to short-term capital accumulation. Ubiquitous capital can be combined with resources to realize rapid appreciations in value even although those resources may become quickly exhausted. The same (appreciated) capital can then be disengaged and reinvested elsewhere, but the resources may have gone forever. The capital accumulation time horizon is thus shorter than the ecological one.

But there is an important social dimension to the disharmony of man and resources. The capital accumulation process benefits those with capital, while at the other end of the scale, the poor are also neglectful of the longer-term impact on the environment of their own actions since they respond to a short-term logic of survival. In either case short-term interests are liable to inflict permanent harm on longer-term productive capacities, to the detriment of collective welfare. In an unfettered market system, an unequal distribution of income also leads to distorted consumption patterns. The allocation of scarce resources (e.g. land) is determined by criteria of purchasing power, and the restriction of access to them by the poor compounds their environmental misery.

The achievement of greater harmony between man and his environment has important implications for planning institutions in developing countries. What is required is a flexible, multi-level planning system that provides for greater freedom of action at the intermediate and local levels. Flexibility should apply not only to the relationship between these levels, but also to the multi-disciplinary approach of environmentally-sound planning, which should recognize the potential complementalities, as well as the conflicts, of the impacts of different projects on all aspects of socio-economic development. The paper argues for projects and programmes to be considered from a full "contextual" angle.

Environmentally-sound development planning requires improvements in information, and implies the need for studies, both of an impact and prospective nature, the latter designed to orientate the conception of projects and programmes. Another important condition is the spreading of information of environmental consequences of development. This objective can be furthered through wider participation in the planning process, for which the paper strongly argues. Enhanced participation is also a more satisfactory means of giving vent to social preferences which is vital to environmentally-sound development. However, complete autonomy for preferences expressed at the grass-roots level is not advocated, since enlightened middle-level public decision-making bodies must retain powers of guidance and evaluation.

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The aim of this paper is to examine certain methodological and institutional aspects pertinent to considerations of the environment in development planning. It might be thought possible to present and evaluate methods designed to ensure the consideration of the environment in isolation from the over-all framework into which these methods ought to fit, as if there naturally existed methods that can be said universally good or bad. But this is an illusion, for the autonomy of the methodological discussion is in fact limited. Methods are aimed at individual actors in society with given institutional and social positions, and having specific objectives, problems and capacities. The usefulness of the methods depends on their capacity to respond on one hand to the situation as well as the role of these actors in the system of development planning, and on the other hand to the prevailing regulatory system which governs the behaviour of these actors. Hence for example, in market economies methods of raising returns to investment are linked to the institutional reality of private companies seeking to maximize profits in an economic context governed by the commercial exchange of factors of production, goods and services. A transformation of the institutional frame and the means of regulation, and changes in the objectives and roles of individuals in society necessitate a certain renewal and adaptation of the methods employed.

The key point being made is that the consideration of the environment requires both a new approach to development and a new approach to planning. For the great majority of developing countries must today confront simultaneously problems of environment related to poverty and underdevelopment, those linked to an insufficient mastery of hostile natural conditions, and those engendered by man's own activities in transforming his environment.

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This paper is a translation of "L'environnement et la planification du développement: aspects méthodologiques et institutionnels". The author is indebted to Dr. Ian Little and Professor Maynard Hufschmidt for their stimulating and sensible comments on the preliminary draft of this paper; they permitted him to enrich the text and to improve the exposition of ideas, although some fundamental disagreements remain. The author also thanks Professor Ignacy Sachs for his assistance throughout the preparation of this paper.

Far from resolving these diverse types of problem, the current styles of development emphasizing growth while putting aside numerous social costs including those of the environment have often resulted in raising the standard of the environment of the majority of the population rather little and have in some cases provoked a serious degradation, while imposing grave ecological risks in the long-term.[1/] Thus although socio-economic development is necessary for resolving numerous environmental problems (Founex Meeting 1971) and for meeting the needs of the population, the results of impatient growth strategies overemphasizing the needs of accumulation have proved to be negative on both these scores. What is now at stake is to devise styles of development that fully integrate environmental considerations[2/] and assume what might be termed a "needs logic".

Thence the planning aims, principles, organization and institutions must be rearranged to become tools able to promote these new styles of development. In the light of this reorientation the methodological discussion achieves meaning. That is why this paper seeks to emphasize not so much the methods themselves as the possible components of a new planning approach which responds to the needs to consider the environment. On that basis, we can tackle the problems posed by fitting the methods proposed for considering the environment to these new orientations.

With this objective in mind, we cannot escape some theoretical issues, particularly in regard to assumptions about the market as a regulatory system. The author, while acknowledging the historical importance of market systems, insists upon the need to emphasize the importance of institutional contexts. We do not reject a priori the use of price devices for incorporating environmental considerations in certain socio-economic contexts or in certain fields of decision, the contrary of which would be anyway unrealistic. But they are seen as one component in a more complete set of appropriate regulating mechanisms and practices. In particular, we must clearly distinguish between the global social logic of market systems in predominantly capitalist economies (such as the logic of concentration of capital and power) and the price mechanism as a technical device of allocating resources and regulating individuals' behaviour in certain delimited conditions.

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1/ J.P. Milton and T. Farvar ed., The Careless Technology - Ecology and International Development, (New York, the Natural History Press, 1972).

2/ I. Sachs, "Environment and styles of development", Economic and Political Weekly, vol. IX, No. 21, (Bombay, 25 May 1974).

I. MANIFESTATIONS AND ORIGINS OF THE EXTERNALIZATION OF THE ENVIRONMENT

1. What is "the environment"?

It is first necessary to define what "the environment" is to mean in this paper. Many different conceptions are encountered in the literature, but these differences depend mainly on the choice of reference. In systems theory the environment is what is outside a system although being in interaction with it. At the societal level, the environment may be defined as the physical and ecological factors in interaction with socio-economic ones. Man obtains a wide range of resources and amenities from the environment and discharges his waste into it; the environment is also a source of disamenities and diseases. The action of man transforms the environment which can no longer be called "natural".

In this paper, the consideration of the environment in the development planning context refers to the control or regulation of the reciprocal influences, actions and exchanges between what can be called the physical environment (as opposed to the social environment) and human societies at the different levels of social concern (from the village or the city to the level of the biosphere).

Such interactions between man and nature are regulated in very different ways, according to whether we consider different societies or historical periods, or whether we analyse different kinds of mechanism used by one society at any one moment. There is often a tendency to define the environment in relation to one regulating "system", such as private ownership, which would be the case if we equate the environment with public goods as it is sometimes proposed. In this case, defining the environment according to the ways man handles it would not facilitate the critical analysis of those ways. For example, in our perspective, there is no particular reason to consider that industrial pollution is an environmental problem only insofar as it affects the inhabitants of a particular neighbourhood and not as it affects workers in a factory. With our approach to the environment, it is not possible to reduce all aspects to a single scheme, precisely because the environment comprises different sorts of goods, services and problems and because human societies use various instruments to tackle them.

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From the development planning point of view, the question is not one of considering the transformation of the environment ("natural" or man-made) per se, but essentially the feed-back of these transformations into the evolution of human communities and into present and future social welfare. The actions of man may be positive for improving the environment, as well as ecological productivity (development of the potential of renewable resources) and amenities (protection against diseases, sanitation, landscape,...). Nevertheless, there are also serious negative consequences including:

a) The degradation of the human environment and of living conditions;

b) The malfunctioning and non-functioning of urban systems, particularly in respect of aspects of overcrowding,

c) The risks for individual health and for collective genetic status provoked by the wider use of processed products and by various forms of pollution (chemical, radioactive, or deriving from heavy metals, etc.),

d) The intensive use of non-renewable natural resources which can be considered from the point of view both of the risk of exhaustion and scarcity relative to needs, and of the risk of going beyond the "outer limits" 3/which determine the conditions necessary to maintain global equilibrium, particularly in respect of climate. In this connexion, serious uncertainties arise from the growing consumption of the energy stock (hydro-carbon and nuclear), with the possible consequences for global thermic equilibrium.

e) The permanent alteration or destruction of the capacity of regeneration of renewable resources (such as cultivable soils and forests) brought on either by the disruption of the cycles that maintain the renewable capacity, or by over-exploitation, or by the transformation of ecological conditions, or lastly by increasing sterility resulting for example from the encroachment of urban development on good agricultural land.

Generally speaking, these problems arise as the joint result of human activities and of natural occurences. Even natural disasters such as tornadoes and flooding are aggravated in their severity and frequency by human activities or by environmental mutations inspired by man (e.g. deforestation on the slopes of the large river basins of Asia and its impact on flooding through the modification of the hydrological regime; the social consequences of flooding are amplified by the increasing occupancy of flood plains in response

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3/ W.H. Matthews ed., Outer Limits and Human Needs, (Uppsala, the Dag Hammarskjöld Foundation, 1976). Though controversial, the concept of outer limits is useful because it stresses the fact that the scale of human activities is such that, for the first time in history, they may interfere with global equilibriums of the planet. It is worth noting also the empirical value of the concept at regional levels where "local" disruptions may have dramatic consequences (see the problems of desertification).

See also M.R. Biswas and A.K. Biswas ed., Food Climate and Man, (New York, John Wiley and sons, 1979).

to migratory incentives). Thus environmental problems are socio-economic in nature in two senses. First, in terms of the socio-economic consequences of these problems and second, in terms of the socio-economic reasons which help to provoke them.

2. Factors at the origin of environmental problems

Since environmental problems are not the result of inevitable natural processes, it is necessary, in order to determine how they should be integrated into development planning, to seek the socio-economic factors being at their origin and ask why these problems were not taken into account ex ante so that they may not appear or may be limited.

In discussions on the interaction between growth and the environment the blame has often been put on economic expansion, population increase and technology. Without reviewing this debate in detail it is nevertheless worth noting that the effect of these apparent causes of environmental degradation depends on the socio-economic context in which they operate. Thus for example, the environmental impacts of population growth are likely to be very different according to whether the distribution of incomes or the access to resources and factors of production, particularly cultivable land, are very unequal or not; similarly, it may be noted that choices of techniques are made by individual actors in accordance with a regulatory system which depends on existing social and institutional structures (e.g. patterns of land holding, extent of commercial production and of the monetary economy etc.). Hence, it can be seen that if the causes of environmental problems appear to reside in such factors as production technology, the ultimate responsibility lies with socio-economic means of control and regulation and the corresponding institutional structures.

In view of the complexity of ecological processes (such as threshold or cumulative effects, the multiple intermediary chains of causation within ecological systems, and the temporal and spatial remoteness of initiating actions from impacts) the importance assumed by uncertainty and ignorance of the ensuing consequences of activities for the environment should be considered as a major issue. These difficulties, which are most visible at the time that concrete actions are taken, should be considered as substantial additional obstacles, implying the need for specific decisions tools and

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planning attitudes. In this light, ignorance should not be considered as a fundamental cause of environmental degradation. Even perfect forecasts of environmental consequences would be far from sufficient to ensure that they are adequately taken into account by the actions of individuals.

3. The externalization of the environment: "outer" and "intrinsic" externalities

This being so, environmental problems need to be tackled basically as the consequences of the fact that some interactions between man and his milieu are not considered adequately by people in their decision-making framework.[4/] The workings and the scope of this "externalization" differ according to the specific characteristics of each society; hence, given the diversity of ecological situations, it is difficult to propose a universal analysis on how environmental problems arise. However it is possible at the theoretical level to distinguish two types of externality process which can be observed to be combined in most concrete problems. These are "outer externalities" and "intrinsic externalities".[5/]

"Outer externalities" are defined by the fact that certain processes are outside the present field of influence of the prevailing regulatory system that guides or governs the socio-economic behaviour of individuals. Being not regulated, these processes can develop and create environmental problems.

This idea of "outer externalities" must be understood to have a general application to any type of regulatory system. In a centrally planned economy, it would apply to processes or factors which do not enter into cost accounting or into definitions of the objectives imposed on producers. In a traditional non-monetary economy where land is a collective good, it would apply to the activities of individuals which fall outside the purview of collective rules of land utilization and collective work organization.

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4/ O. Godard and I. Sachs, "L'environnement et la planification", in A. Ternisien ed., Environnement et Qualité de la Vie, (Paris, Guy le Prat, 1975).

5/ The term "externality" is used in this paper in the context of what we call the externalization of the environment; it is not to be confused with the specific neo-classical concept of "externality" although there is some relationship.

In the context of market economies, this idea is inherent in the neo-classical concept of technological external effects,[6] which identify the direct interdependences outside the control of the market, and manifest themselves directly as variables of the utility or production functions. Such direct uncompensated interdependences can exist because certain products of the environment (goods, amenities) are not privately owned, whereas ownership rights are a condition for their incorporation into the market regulatory system. This concept of external effects is useful in market economies in envisaging the many types of circumstances in which individuals make an unregulated use of free or partially public goods: utilization of natural resources, emission of pollutants into the environment, the enjoyment of environmental amenities etc. It is worth recalling that the existence of these external effects imperils what is conceived of as the optimal allocation of resources by the market.[7]

The main interest of this concept of "outer externalities" is to show that a great part of environmental problems do not originate in ex ante uncertainty about impacts, and to open the way to solutions of internalization by reintroducing the externalities into the field of influence of the regulatory system. Examples in the market context are pollution emission charges, fines for nuisances, tolls for the use of public goods and so on. These solutions, favoured by economists, have been partially adopted in many countries and have been considered as the basic environmental policy instruments by the O.E.C.D. governments. They constitute real progress in that they introduce regulations where there were none before. As to whether or not they are adequate and sufficient depends on the problems. Generally, however, we must account for the often ignored second type of externality: the "intrinsic externality".[8]

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6/ T. Scitovsky, "Two concepts of external economies", Journal of Political Economy, vol. 62, No. 2, 1954; E.J. Mishan, "The postwar literature on externalities: an interpretative essay", Journal of Economic Literature, vol. 9, No. 1 (March 1971); J.J. Laffont, Effets Externes et Théorie Economique, (Paris, Ed. du CNRS, 1977).

7/ R. and N. Dorfman, Economics of the Environment, (New York, W.W. Norton, 1973).

8/ O. Godard and I. Sachs, "Environnement et développement: de l'externalité à l'intégration contextuelle", Mondes en Developpement No. 24, (Paris, 1978).

As far as the environment is concerned, "intrinsic externalities" are environmental problems that arise through the normal, unfettered functioning of a prevailing regulatory system and not because of its only partial application as in the case of "outer externalities". The very existence of "intrinsic externalities" is the expression of some deficiency of the particular regulatory system concerned in the context in which it is applied. When adopting a historical perspective, it is often apparent that this deficiency embodied in the regulatory system is not disfunctional till a certain period when it becomes a source of contradictions in the socio-economic system, because of the processes it has created and/or because of the transformations of the technical, economical, social or demographic variables of the society. The very problems that the regulatory system should permit society to avoid are then produced by this system. This is why we describe them by the seemingly contradictory terms of "intrinsic externalities".

It seems that this concept may have a wide field of application. We may analyse the bureaucratic phenomenon in this way. But we may also consider how traditional economies, which succeeded at times in maintaining a stable equilibrium with their physical environment and the resources it contains, have known growing difficulties and have finally been condemned to disappear or to change their mode of production and the corresponding rules of regulation. On the other hand, it is common to observe that the introduction of a new regulating system, e.g. the monetary economy, into traditional economies has led to a change in the rationality of peasants and to the abandonment of certain functions or regulations traditionally assumed and for which substitutes have not emerged under the new monetary regulations (long fallows giving pasture to pastoralist and assuring the renewal of humus, security stocking of agricultural products and so on). The dramatic process of desertification of the Sahelian region in Africa can be seen as the joint-product of "outer" and "intrinsic" externalities embodied in the past efforts of development in that region.9/

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9/ See the documents of the United Nations Conference on Desertification, Nairobi, August-September 1977.

When considering environmental problems two important questions (which are not exclusive of others) have to be underlined in relation to "intrinsic externalities". They concern processes of concentration of income or ownership distribution, and the social time horizons of individuals:

a) the regulatory mechanisms in certain economic systems (market regulations in capitalist economy for instance) lead, in certain phases, to concentrations of income, capital, means of production, and power distribution. These concentrations are not neutral at all for the environment, though we cannot draw mechanical conclusions. Because they change the conditions of access to the means of satisfying basic needs, these processes induce changes in the rationality of individual behaviour with respect with the environment and natural resources. Poor peasants are often condemned to overexploit marginal lands because the best ones are monopolized by big landowners emphasizing export crops. The Latin-American contrasted situation of latifundia and minifundia leads to both overexploitation and underexploitation of land resources. In the same way, in Haiti, the best lands of the plain have been monopolized and the great majority of poor peasants try to obtain their living from the slopes of the hills, with considerable negative impacts on the environment (degradation of the vegetation, erosion, alteration of soils, etc.). Fuel needs for cooking have long been a major cause of deforestation and this is amplified by the rises in the price of petroleum products. In Asian countries, the inequality of cattle ownership is a constraint on the development of biogas as a major component of a strategy of conservation of the environment and of natural resources; the situations of China and India are very contrasted in this regard. Thus the distributional consequences of regulatory systems are a major source of "intrinsic externality". 10/ This is not to say that equality as such is a sufficient condition for adequate environmental conservation. In certain cases, there may be some contradictions (in particular when it is necessary to limit the supply of environmental goods in order to respect environmental carrying capacities) but they often can be overcome.

b) Regulatory mechanisms and their corresponding social structures establish and maintain the pre-eminence of a certain social time-horizon which delimits the field of action of individuals. The nature of this social time-horizon is of considerable relevance to environmental problems in view of the gestation, which may be very long, of the processes of ecological degradation and of resource renewal. The question of what determines the social time horizon of individuals and groups is a very complex one; cultural factors

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10/ For an analysis of the relationship between environment and poverty, see S. Sigal, "Poverty and pollution", Ecodevelopment News No. 1, (Paris, CIRED: Maison des Sciences de l'Homme, February 1977), and E.P. Eckholm, Losing Ground. Environmental Stress and World Food Prospects, (New York, W.W. Norton, 1976).

are certainly essential, but we may emphasize the importance of the socio-economic structure and of the regulatory system in which a certain time concept is always embodied. The divergence between the time dimension of ecological processes and the time concept carried by the regulatory system is also a major source of "intrinsic externality".

The consideration of a) and b) above incites observation of the implications of conditions of income and access distribution on the temporal horizon of individuals: broadly speaking, the poorest sections of the population tend to act on the basis of a short-term logic of survival which inhibits them from taking the longer-term results of their actions on the environment into account (an important example is given by the spread of slash-and-burn cultivation); the rich, on the other hand, may seek above all large profits and high rates of return which undervalue the long-term costs, in the hypothetical case where these costs do not remain as "outer externalities" but rebound on them. In these schematic circumstances, the prevailing social time-horizon is short-term with negative consequences for ecological and social reproduction in the medium- and long-term.11/

Some additional examples of the impact of "intrinsic externalities" within the specific market context are as follows:

a) The pollution and inconvenience to which workers are subject at work are assumed to be allowed for by the labour market, and by wage levels, but it is doubtful whether the level of pollution reached this way can really be considered as optimal and whether its social costs are really accounted for in wages. They should rather be considered as an environmental problem demanding additional intervention, in spite of what certain economists believe. In fact, in developed countries, these problems have been handled partially by the occupational health and safety rules and standards, mainly through the extra-market pressure of workers. In many less developed countries, however, where wages are kept low by supplies of labour far in excess of employment opportunities, there is little if any compensatory intervention.

/b)

11/ Professor Hufschmidt noted in his comments that poverty, land tenancy institutions and capital markets lead many farmers to have extremely short personal time horizons.

b) The fact that natural resources can be privately owned and subject to exchange in the market by no means prevents them being over-exploited. In the case of renewable resources, their capacities for regeneration may be exceeded, depending on the relationship between the ecological and the economic time-frames, the latter being determined mainly by rates of return and the possibility for capital to be withdrawn expeditiously from the particular process of resources exploitation in which it is incorporated. In certain cases, it may be more profitable for a "capitalist" to destroy the renewal capacity of resources by rapid exploitation and to invest afterwards in other resources or activities, than to maintain his capital tied to those resources so managed as to assure long-term sustainability. Thus the paradox arises whereby society may place an implicit "preference" on its extinction through the exhaustion of resources, even though the possibility exists of utilizing these resources in such a way as to ensure a continuous and indefinite rise in the level of consumption. 12/

c) Market adjustments in the use of land lead to spatial over-concentration and congestion and induce the poorest groups to settle in zones which are the most insalubrious from the environmental point of view, in terms of proximity to polluting factories or other points of waste discharge. 13/ Some public control of land could limit this environmental segregation and maintain a better average environment for the whole population. Moreover, the market system tends to thwart the possibilities of improvements in their environment benefiting these poor groups, for upgrading generally brings with it increases in rents and property incomes which leads to their removal to even more unfavourable areas. In these circumstances, it is the regulatory system which obstructs an improvement in the environment of the poor.

The introduction of the concept of "intrinsic externality" leads to emphasis on new issues about the "internalization" solutions. The environmental problems implied at least in part by such "intrinsic externalities", cannot be worked out by the extension of the predominant regulatory system; on the contrary, they need some restriction or limitation of the field of influence of this regulatory system or of the regulatory role it assumes in that field.

This can be obtained by establishing new regulatory devices for certain types of decision or by combining new tools with the present ones

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12/ R.M. Solow, "The economics of resources or the resources of economics. Richard T. Ely lecture", American Economic Review, vol. 64, May 1974; T. Page, Conservation and Economic Efficiency. An approach to Materials Policy, (Baltimore, Johns Hopkins, 1977).

13/ It is the general case of many of the large urban areas of the Third World.

even if their respective logic appears to be different. For example, we can combine price mechanisms with administrative actions setting rules or constraints, or establish certain particular institutional arrangements for the managing of some types of resources, and so on. Meanwhile, it must be made clear that the main consideration is not one of changing technical tools but one of social rationality.

There is a second important issue. When we consider "outer externalities" and we suggest that they should be internalized by some extension of the regulatory system, are we sure that we are not merely suggesting that "outer externalities" be transformed into "intrinsic" ones? If so, we would have introduced one regulation where there was none, but which would be in fact inadequate and would contribute to the continuing degradation of the environment. The question is all the more difficult because more often than not concrete environmental problems are a joint product of "outer" and "intrinsic" externalities. This is a particularly relevant point for all market solutions of internalization, and also administrative ones.

The ultimate conclusion of this "externalization" approach to environmental problems is that the social pre-eminence of accumulation strategies founded upon the combination of these two types of externalities constitutes one of the fundamental causes of environmental problems.

4. The three levels of changes required in order to integrate considerations of the environment

Practical analysis must distinguish three levels of changes at which the integration of the environment must be sought:

a) Changes in the material content of styles of development at the level of the social demand as well as that of the supply of goods and services, i.e. in respect of life styles and patterns of consumption, technological choices, use of available space and ways of exploiting resources. These are the substantive changes capable of harmonizing environment and development;

b) Changes in the regulatory conditions of the socio-economic system so as to introduce new controls and change other inadequate ones. This is one of the tasks of a development planning system acting as a future-oriented regulatory system. However, although the purpose of these changes in regulatory conditions is to bring about changes of the first type (i.e. in the material content of styles of development) it must be noted, that they should conform to a needs logic far removed from the past development rationale. In

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addition, it should be observed that the regulatory mechanisms and practices have more than an instrumental role (assessed in terms of efficiency) since they also impute certain social values and relationships. Thus they must meet the constituent values of society's broader aims in addition to those that indicate environmental considerations;

c) Changes in social and institutional structures particularly in respect of conditions of distribution. Specifically, in many situations in which environmental degradation is a consequence of poverty in a very unequal distributional structure, considerations of the environment are concerned primarily with the satisfaction of basic needs and guaranteeing access to resources and factors of production; also often implied is land reform and changes in the rights to ownership of resources.

Being able to distinguish these three levels does not facilitate the task of integrating considerations of the environment into development planning. There are many contradictions between the objectives to be met and harmonization is not something that can be attained once for all (see section III).

The main question to be addressed now concerns the choice of tools able to bring about these changes and adequately inform the decision-making process. We shall first point out some issues related to the use of familiar economic tools and constructs. Thereafter, we shall underline what we think to be the main components of a strategic approach to environmentally sound development planning, with implications for the organization of a planning system.

II. INADEQUACIES OF SOME FAMILIAR ECONOMIC TOOLS AND CONSTRUCTS

Environmental economists often seek to resolve environmental problems by orthodox means, especially those derived from the neo-classical approach to market systems. This is not the place to restate the standard comments and criticisms of such an approach, but some comments are in order concerning certain difficulties and issues which have considerable importance for the environment. The great danger of such tools is to transform "outer externalities" into "intrinsic" ones.

1. Some "technical" difficulties or inadequacies

Developing economies are generally very far from the ideal model of a perfect market economy. In the first place, the spread of the market is only partial, although it depends on the country; monetary income constitutes only a part of real income and a certain proportion of economic activities lies outside the market. The extension of the market has often proved disruptive both in social and cultural terms and for the environment and the satisfaction of basic needs. It therefore seems difficult to base policies on pure market constructs. Internalization tools, such as markets of pollution allowances or taxes defined so as to equate the marginal social costs of environmental damage with the marginal social costs of depollution, can only have limited efficacy being restricted to the monetized parts of the economy - they can be used to control transnational companies for example. They may also be self-defeating if the obligation to pay taxes encourages alternative remunerative activities damaging to the environment. The willingness of individuals to pay does not seem to be a satisfactory inducement for environmental considerations, as it is stressed in a more general way by the "basic needs" approach.[14/]

Secondly, inadequacies of information on environmental consequences and on the resource potentialities of the environment are considerably more serious than in developed countries whether at the general level, with respect to specific ecosystems, or at the level of information of various economic

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14/ See for instance P. Streeten, "Basic Needs: Premises and Promises", Journal of Policy Modelling, vol. 1, 1979.

agents and groups within the population (even if in some cases, popular knowledge about the environment constitutes an underutilized source of information). This information inadequacy should be another reason for prudence in the use of the individual willingness to pay criteria and call for specific tools of evaluation and decisions adapted to such uncertainty (see section III).

There are other characteristics of environmental problems which make them scarcely amenable to current economic constructs.

The scheme of market internalization of social environmental costs requires the ability to evaluate environmental costs and benefits associated with physical transformations, i.e. the consequences of these transformations for collective welfare. It also requires the ability to identify the agents responsible for these transformations so that the social implications of their conduct may be imputed to them. Both requirements are often difficult to satisfy so far as environmental effects are concerned.

In the first place the ecological consequences of an action or a programme may not have immediate clear-cut impacts on specific agents or groups or on general social welfare. It is thus difficult to go beyond the specification of physical effects. Secondly, even the specification of "final" physical effects is sometimes very hard; we may only know the present ecological processes occurring without being capable of foreseeing what will be their result. Thirdly, and in like fashion, certain environmental problems, because of the ways in which ecological interactions combine - synergistic processes - are the result of over-all externalities or are the consequences of system effects which it is impossible to reduce to additive components or for which it is impossible to identify the contribution of each individual actor except in an arbitrary manner.

However, it is difficult to consider such situations in the same way as if there were no social consequences whatsoever. One of the most important issues in incorporating environmental problems into development planning consists in knowing how to treat environmental effects and consequences whose cycle of degradation is continuing and the ultimate damage from which remains unknown. This question is especially important when the processes may be considered to be irreversible. New planning tools and attitudes have to be established for such situations and the usual economic evaluations

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schemes should give attention to this aspect (see section III). In particular, this combination of irreversibility and uncertainty should lead to a different time approach which is not compatible with the usual succession of short-term optimizations that are part of current internalization procedures.

2. Some basic methodological issues

In any economic evaluation, two concepts have a fundamental role. They are the willingness of individuals to pay as the ultimate reference of the evaluation, and the social time preference rate as expressed in discounting practices. Both concepts are at the centre of fundamental methodological issues for the environment as well as for development planning.

Willingness to pay and social preferences for the environment. Some general points have first to be reviewed. In the market place, willingness to pay is the means by which individuals express their preferences about commodities supplied. This expression of individual preferences is directly constrained by several factors: disposable monetary income; effective choice; the juridical context which defines the respective rights of individuals and, in this case, the environmental laws;[15/] the extent of individuals' information about the alternative consequences of their choice.

In a less direct way, it depends also on various psycho-social, educational and cultural factors, which correspond to influences tied to non-economic mechanisms, even if their origin is sometimes properly economic (such as the attempt of producers to manipulate the desires of consumers

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15/ In welfare theory there exist in fact two possible preference measures: a) compensating variation (the maximum price one is willing to pay), b) equivalent variation (the minimum price one agrees to receive for giving up an opportunity, good or right). These two measures are quite different, for the second, although not independent of income, is not constrained by it, whereas the first is. One or other of these measures will prevail according to whether it is the "victim" or the "aggressor" who is favoured in the use of environment. In certain cases the equivalent variation may be infinite, as may result for instance from enquiries about the social cost of the noise of big airports. Again, a possible danger of a new irrigation system in a rural area is bilharzia because of snail infestation of the irrigation canals, (as in the case of the Aswan Dam). The social cost evaluation much depends on which measure is to be adopted. For this question, first stressed by E.J. Mishan, op.cit., see the developments of D.W. Bromley, "Property rules, liability rules and environmental economics", Journal of Economic Issues, vol. XII, No. 1, (March 1978).

through advertising). More often than not, the preferences of an individual depend also on the preferences of others either because of "demonstration" and "social sign" effects or because the alternative consequences of the choice depend on the courses of actions chosen by others.16/

In order to accept willingness to pay as a criterion we must be satisfied as to the social legitimacy of the various constraints or influences which weigh on it: whether income distribution is more or less optimal; whether the legal context is adequate concerning individual rights and the environment; whether information of individuals is sufficient; whether the scope of options needs to be enlarged; whether there are important interdependences between individual preferences.

The process of evaluation thus inculcates a logic pertaining to a social "status quo", which in fact delays solution to some important environmental problems insofar as they result from what we called "intrinsic externalities". It is worth-stressing that this approach is also contradictory to the conception of social development as a process of structural change (income distribution, institution and legal framework, cultural change etc.).

In fact - and this point is critical for the consideration of the environment - the rough willingness to pay criterion does find some allocative validity for short-term adjustment within the present set of constraints, but should be dismissed for all future-oriented actions or for problems or questions which have a time dimension that extends beyond the short-term and are to an extent irreversible, as is the case of most environmental questions.

For decisions having future implications, it seems that two different sorts of preferences must be identified:

a) <u>preferences about the change of the set of constraints and the institutional context</u>. The preferences expressed within a context are by nature different from preferences with regard to changes of that context. It is these kind of "strategic" preferences which are needed for development planning and for guiding considerations of the environment. It is clear that they are more appropriately expressed through general political processes than via the market,

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16/ We find here problems like Tucker's "prisoners' dilemma" or the "isolation paradox" and the "assurance problem" analyzed by A.K. Sen, "Isolation, assurance and the social rate of discount", Quarterly Journal of Economics, vol. 81, 1967.

ideally through a system of participatory planning. The market works within the "rules of game" while political processes and participatory planning aim at changing the "rules of game" as well as working within them.[17]

b) future preferences, adapted to a new context and a new set of constraints. These future preferences can never be obtained directly but must be derived from current preferences through correction and interpretation. In this perspective it is often stated that the future relative prices of environmental services and amenities and, to some degree, of natural resources should progressively grow because:

(i) supply will become scarcer through the actions of man;

(ii) demand will increase because rising income levels will imply a positive shift of relative preferences towards the environment as opposed to material consumption; [18]

(iii) technical progress has an a-symmetrical effect on respectively the environment and material consumption, since it lowers production costs of commodities through productivity gains.

Even this dynamic approach to social preferences to allow for the consideration of the environment in development planning has to be qualified by additional considerations.

If the present context (income distribution, legal state, etc.) is not considered to be satisfactory, it may be considered better not to wait for contextual transformation before inserting preferences different from current willingness to pay into the evaluation scheme. This way the aims of limiting the social consequences of the present unsatisfactory context can be met. Similarly, if income distribution is not satisfactory, we may want to limit the scope of market regulation and prevent market extension to the environment just because it would increase social inequalities. In this case, current willingness to pay criteria will be spurned, even though there are no irreversible future consequences at stake.

It often seems very difficult to separate the actions or programmes intended to transform some components of the context and actions related to the current working of the present context. Economic development projects are to be assumed not only to have production objectives but also to contribute to the more general transformations of the social /context.

17/ This is why market preferences and political preferences expressed through participatory planning cannot be considered as symmetrical, even if both sorts of preference cannot be conceived as independent from the social-cultural-political context.

18/ Under present patterns of income distribution, the relative preference for the environment is generally greater in higher income groups than in lower income ones. But expressed willingness of individual consumers to pay does not mean that higher income groups are necessarily more disposed to take the environment into consideration than lower income groups, in spite of the apparent contradiction.

context. This too limits the value of the current willingness to pay criterion.

Furthermore, because of information problems confronted by individuals (access to information, educational or technical capacity to integrate it, etc.) or because of specific collective interests, individual preferences may not be the main or the only reference for evaluation for decision-making purposes. Both aspects are likely to be particularly important for environmental problems, as is often stressed (complexity and long-term aspects).

Finally, we have to mention the commonly stressed difficulties about, on one hand, dubious monetary evaluations of some key qualitative aspects of the environment (aesthetics of landscapes, quality of life, and so on), and on the other, the tainting of expressed preferences by individual cost-bearing considerations (the "free-rider" problem).

The general conclusion of this analysis is that the current willingness to pay criterion is of a limited value for guiding considerations of the environment. Willingness to pay may be thought of as a basis for more elaborate preference-setting procedures taking the preceding qualifications into account. But it is in fact very difficult to correct current "willingness to pay" preferences adequately. For example, low-income groups suffering from a very poor environment and limited access to resources express low absolute and relative preferences for the environment through the willingness to pay criteria, while contributing to its degradation (bad sanitary conditions, pollution and bad waste disposal, etc.). The usual objection to dependence on the willingness to pay from the income distribution angle is that planners can give different weights to the various income groups. But if the weighting of willingness to pay can weaken the distortions of income distribution, it does not provide a definitive answer to the question of which preferences are to be considered. In fact, in such cases, a combination of a "basic needs" approach, technical "environmental expert" recommendations, planner preferences and participatory planning (see section VI), is more likely to give more satisfactory results than the current willingness to pay approach.

Another important conclusion to be drawn is that it is not possible to adopt one universal approach to every environmental question. The sorts of preferences to be considered and the way they may be obtained depend on the following features:

- are there important future consequences or not?
- if so, are there important implied irreversibilities?
- what is the degree of collective concern (local, regional or international impacts)?
- is there any feedback of environmental impacts on natural resources use (for production or for basic needs satisfaction)?
- is there any feedback of environmental impacts on the physical integrity state of health of some group of population?
- are the environmental effects or goods at stake easily amenable to a system of privately owned goods?

This suggests the importance of how time is considered.

Environment, time and discounting. The discount rate currently used in private profitability analyses as well as in social cost-benefit analyses is generally considered to express a time preference from the point of view of the one making the evaluation. For cost-benefit analysis, which is supposed in its pure form to express the point of view of the whole society, the discount rate is then considered to be the social time preference rate. Using this tool that we may supposedly compare processes as various dates and in different time streams of costs and benefits from the societal point of view. It is necessary to elaborate on the real meaning of discounting, however, to decide whether this analytical device is acceptable from the environmental point of view.

In welfare economics, there are two possible approaches to the social time preference rate. The first one is tied to consumption flows and refers to future growth of economic welfare[19/] and the second to the marginal return on capital investment and thus to the process of capital accumulation. In perfect market conditions, both approaches would lead to the same result at the quilibrium point since the capital market should equate marginal supply and demand of capital by a unique rate.

With both approaches, it is clear that discounting is tied more to economic growth processes than to time as such. If we anticipate a future situation where economic welfare is lower than at present, because the population growth is higher than the economic one or because needs have been growing at a higher rate than consumption, we should have negative discount rates. In fact, discount rates defined for national economies, and effectively used, are always positive and defined in terms of conditions of capital profitabllity. So we may essentially consider the discount rate as the regulator or the instrument of growth strategies and processes as far as they depend on capital accumulation.

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19/ In fact the consumption approach of the time preference rate depends on:

a) the pure time preference, which corresponds to the idea that we prefer to enjoy any advantage today rather than tomorrow; at the societal level this can be meaningful in situations where, for example, quick economic results are a condition for preserving national political independence,

b) the growth rate of consumption per head,

c) the elasticity of the marginal utility of consumption with respect to consumption growth.

See, for example, C. Bruce, Social Cost Benefit Analysis. A Guide for Country and Project Economists to the Derivation and Application of Economic and Social Accounting Prices (IBRD, August 1976).

This leads to important conclusions for the environment. First, discounting implies a postulate of potential intertemporal compensation, i.e. that the accumulation of value provides an adequate real compensation of future costs. This compensation by accumulated value is possible in the following cases:

a) The value may give access to some substitute for the opportunity or good lost, which is the case for some resources or reproducible commodities,

b) The value may be spent on adequate means of production to reproduce or restore the opportunity lost or the goods destroyed.

It means that the object of the cost must be either substitutable or reproducible. This gives us two general principles in respect of which discounting is acceptable for environmental effects:

a) Conditions of renewal of or reproduction must be permanently maintained, if they cannot be adequately substituted;

b) Irreversible effects and the rate of use of non-renewable resources must be such that adequate substittues are provided in due time. 20/

Discounting, however, cannot be applied to costs of use of non-reproducible items with no substitute, or of the disruption of the conditions of renewal of irreplaceable ones.

Secondly, there is no particular reason to apply a discount rate defined by the conditions of capital accumulation to future costs or advantages which have no capital opportunity cost, such as environmental amenities. For natural resources and ecological conditions which are a gift of nature but which suppose some consumption of factors of production to be used in order to enjoy them, this discount rate can only be applied to this consumption (access and process costs) and not to the fact that natural resources are consumed, with ensuing ecological consequences. So it is legitimate to adopt specific time-frames for regulating ecological conditions and not to impose the implicit time frame of capital accumulation to the natural context.

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20/ When we speak of adequate substitutes, we mean "use value" substitutes capable of satisfying the same concrete need or aspiration. In this sense, additional consumption of material commodities will never be a substitute for lost environmental amenities for example, even if the demand for the latter is redirected to the former. It is worth stressing that providing substitutes depends on technical change and on adequately oriented research and development.

What is at stake is how man can assure, or at least not obstruct, the reproduction of ecological conditions as well as he succeeds in reproducing factors of production (labour, capital equipments). Now the domination of the specific time concept of capital accumulation has had and can have disastrous effects on the environment and, by feedback, on the long-term conditions of economic growth. This is partly because capital is not bound for ever by its material composition at one moment (land, natural resources, productive equipments, etc.); the cycle of capital permits it to be progressively disengaged and put to work profitably in other material processes. This permanent "new frontier" logic, which is very disruptive for the environment, can only lead to a long term final failure when there is suddenly no "elsewhere" to go, except if we trust a continually advancing technology acting as a deus ex machina and enabling social production to become increasingly independent of disrupted environmental conditions.

In conclusion it may be observed that it is true that the over-exploitation of the environment and its resources, and the disruption of ecological equilibrating processes may raise levels of income and profits in the short-term. But this degradation is, as a whole, irreversible and will never be compensated by future extra-consumption. Moreover this degradation may seriously imperil long term development perspectives.

What are the operational implications to be drawn? In fact, on the basis of our main conclusion, i.e. discounting has a limited scope and not a universal value for inter-temporal choices, various empirical answers can be given to environmental questions:

a) It is possible to define precise constraints about the use of the environment and resources, i.e. to adopt a scientifically-based system of management of the environment and resources aiming at the long term objection of global sustainability. In that system of constraints, we can let discounting play its role, if we adequately shift the relative prices of resources so as they will be adapted to new contexts of supply and social preferences; 21/

b) If we are uncertain about the correct evaluation of future prices and preferences about environment but if we presume they are possibly underestimated, we may adopt the theoretically heterodox solution of using a specific lower discount rate for environmental aspects of development projects or for particular projects of environmental conservation, the social advantages of which are not easily amenable to monetary values;

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21/ Here, we are considering accounting prices for evaluation purposes and not real exchange prices on the market. The distributional consequences of any regulation of the demand by the price mechanism have to be anticipated and may lead, for basic resources, to the choice of other means of regulation.

c) We may also adopt explicit multi-objective approaches and so maintain discounting only for the criterion of capital accumulation. The long-term environmental state can therefore be made a criterion on its own;

d) Certain specific programmes related to the environment and the conservation of resources may only be evaluated through cost-effectiveness analyses, the discounting practices being only used in order to choose between alternatives aimed at the same substantive objectives about the quality of the environment;

e) In a more technical context, the discount rate to be used for natural resources can be defined by the rate of growth of the productivity of natural resources, which corresponds to the growing efficiency with which we use them. In such a way we equalize the respective situation of the successive generations.[22/]

It is true that intertemporal choices have to be made by present generations but it is their responsibility to take the future generations' interests into consideration. This is made on one hand by the socio-economic development process; it must also be made by an adequate consideration of the environment which will permit future generations to dispose of a safe environment and resources base. For this aim, discounting is not an adequate over-all tool, and other instruments and concepts are needed. This conclusion, moreover, is reinforced by the importance of uncertainty.

These conclusions and proposals about the use of common economic tools and constructs call for a strategic approach of the regulating system explicitly intended to change present styles of development from the point of view of environmental considerations. They call also for a development planning apparatus which associates institutions and methods that are not limited to simple decentralized project planning founded upon the generalized use of cost-benefit analysis,[23/] nor limited to market simulation for the programming of production.

/III.

22/ This point has been suggested by Professor Hufschmidt in his comments. Combined with the "substitute" rule, such a discount rate leads to an intergenerational equity from the point of view of access to resources.

23/ For an opposite point of view, see for instance N. Calden and A. Wildavsky, Planning and Budgeting in Poor Countries (New York and London, John Wiley, 1974).

III. STRATEGIC IMPLICATIONS OF THE INTEGRATION OF THE ENVIRONMENT FOR THE CONCEPTION OF DEVELOPMENT PLANNING

Clearly, the question of taking the environment into consideration does not on its own provide the whole conceptual basis for a planning system. Yet the question, in all its facets, contributes to new approaches to planning. Hence, it is necessary to seek out the main dimensions of this adaptation.

In practice, development planning is often related to the efficient utilization of means, subject to an annual budgetary process. In other words, a rationale of means takes precedence over the rationale of ends, almost as if the question of desired aims is self-evident and therefore unimportant. This rationale of means has sometimes led to the implementation of "projects of society" that turn out not to correspond well to social preferences. Environmental problems are manifestations of such contradictions and it is obvious that their need to be considered raises the whole question of the objectives of socio-economic development.

One of the primary functions of planning should be to provide an institutional framework contributing to the realization of collective preferences and aims and going beyond the expression of existing conditions This goes for the preferences both of consumers and of policy-makers. Specifically, it is imperative that the various social interests be made aware of their own relationships to the environment and of the environmental implications of alternative "projects of society" or courses of actions which may be presented to them. This is all the more vital if the easier alternative of estimating future preferences as the extrapolation of past patterns of behaviour or on the basis of pure market expression is spurned. Development planning must be associated with institutional structures capable of fostering a genuinely collective conception of environmental projects and interpreting information on impacts so as to facilitate environmental considerations. Such expression of collective preferences must give recognition to the plurality of perceptions for the satisfaction of needs and account for the various social interests connected with the environment. Stressing objectives and the determination of preferences naturally implies a participatory form of planning (see section VI. below).

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The consideration of the environment cannot come about through minor adjustments to existing growth-oriented models but calls for more fundamental changes in development strategies both in the material and social senses. Integration of the environment itself must constitute a permanent conceptual dimension for all sectors governed by the system of planning, this being reflected in the evaluation criteria for sectoral decisions. But given the interdependence between choices and margins of freedom possible at various levels and in various sectors, the over-all dimension of the environment requires in planning terms a change in the relationships between sectors in order to reach new modes of "horizontal" and "diagonal" integration, on the basis of contextual approaches.[24/]

A contextual approach to a problem begins with the identification of those relevant variables having some influence on the problem at stake even if they belong to apparently distant fields or sectors. After analysis of the action of each variable and of interactions between them, it leads to an indirect action strategy in order to solve the problem by an action upon its context. For environmental problems, this contextual approach underlines the need for action on locations and land use, technological choices and consumptions patterns.

Such an approach is not compatible with the pure functional-sectoral organizational model. "Horizontal" integration seeks for co-ordination between various functional activities inside a spatial unit, and insists upon interactions (good or bad) and complementarities. "Diagonal" integration corresponds to a trans-functional integration which is not organized on a spatial base but from the viewpoint of a particular "problematique" or objective, as with environmental concerns.

Therefore the environmental dimension must be considered even at the stage of conception of strategies, plans and projects in such a way as to avert intrinsic and outer externalities. Several considerations are involved in making clearer the matter of formulating development activities that incorporate the environmental dimension.

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24/ I. Sachs, Environnement et Développement, Nouveaux Concepts pour la Formulation de Politiques Nationales et de Stratégies de Coopération Internationale, (Ottawa, Environnement Canada/ACDI, 1977).

Using the ecosystem concept as a paradigm for the conception of man-made systems. The ecological relationships between the various constituents of an ecosystem ensure that the material and energy cycles constantly reproduce the over-all structure through permanent adaptation. Instead of conceiving production activities as juxtaposed, we should try to establish closed cycles by utilizing the waste of one production unit as input of the next, and to develop complex complementarities between activities. Many examples can be given:[25/] polyvalent multi-crop agricultural systems, systems combining cattle-raising and farming, or complex combinations of mixed farming, cattle-raising and aquaculture with an intensive use of waste, inspired from the millenary traditions of south Asia. Such an approach contributes at the same time to the solution of problems of pollution, waste disposal and resources, and raises the level of local self-reliance.

The adoption of specific planning concepts to take into account uncertainty in environmental effects and preferences. Confronted by the uncertainties noted above, planning must respond in two parallel ways. In the first place institutional means and scientific and technical information tools must be harnessed to diminish progressively the uncertainties about environmental preferences, ecological problems and impacts.

Secondly, given the inflexibility of many decisions, particularly in regard to the use of space, and given the presumed irreversibility of many environmental effects, specific planning criteria are required. Future options must be fore-shadowed by allowing flexibility in spatio-economic systems; also, an attitude of ecological prudence is required, respectful of the thresholds and the "carrying capacities" of eco-systems, allowing for the regenerative potential of renewable resources and avoiding as far as possible large-scale transformations of the environment (vast dams, alteration of river courses and so on).

When these principles cannot be put into practice, programmes should where possible be divided into small stages which permit a progressive transformation of the environment. This way, between each stage, we can

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25/ A. Bergeret, "Ecologically viable systems of production. Illustrations in the field of agriculture", Ecodevelopment News, No. 3 (Paris, CIRED: Maison des Sciences de l'Homme, October 1977).

get information about the impacts of each preceding stage on the environment and introduce further adjustments in the programme;[26] this requires that there are no major indivisibilities built in, and that an adequate information gathering apparatus about impacts is integrated into the programme itself. This "trial and error" approach may succeed in applying the principle of ecological prudence in not too conservative a manner.

As for the evaluation procedures, it seems necessary to integrate the notion of option value and option costs[27] into the calculus in order to tackle situations where uncertainty and irreversibility combine.

The seeking of dynamic harmonization rather than static compromise. Allowing for the environment and introducing corresponding new objectives and criteria may create new contradictions. This fact has nourished the debate about the opposition between growth and the environment. Several approaches are possible. One consists in only taking environmental considerations into account when such considerations do not conflict with other aims considered at the time more important. A second, less restrictive approach, consists of seeking a statically determined compromise on the basis of the present terms of the trade-off. A third approach, which should be pre-eminent, goes beyond the static consideration of those terms and enlarges the field of action to be considered, in such a way as to find solutions harmonizing initially contradictory objectives.

The difference between these last two approaches can be illustrated by the following example. In the presence of a pollution problem the compromise approach would indicate a proportionate reduction in the emission of pollution despite the continued environmental degradation implied. However the harmonization approach would enlarge on the features of the problem and investigate for example the possibility of installing a non-polluting technology whose additional cost would be compensated by the value of by-products; alternative possibilities would be sought by establishing co-operation between the pollution-emitting activity and another process capable of absorbing the waste, thereby transforming a problem of environmental degradation into one of the enhancement of potential resources.

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26/ See C.S. Holling, 1978.

27/ See C. Henry, "Investment decisions under uncertainty: the irreversibility effect", American Economic Review, vol. 64 (December 1974).

In fact, the idea of the environment as only something to defend in order to preserve its natural state is quite insufficient. A positive attitude to the environment is also required, regarding it as the well-spring of resources to be supported and used for furthering the objectives of socio-economic development. Not only additional constraints, but also new development possibilities are at the heart of environmental considerations into account, but an important exercise of collective imagination is always required to grasp both these aspects.[28/] What is at stake is protecting man from his natural surroundings while protecting his surroundings from man. Both man and his surroundings must be developed together however. Although there are instances in which the harmonization process leads unavoidably to middle ways and compromises, such solutions should prevail only when all possibilities of harmonization have been explored.[29/]

This harmonization approach implies that development planning should make adaptation to specific ecological and social conditions a first-order objective. Instead of adapting eco-systems to techniques which have proved efficient in other latitudes and contexts, development planning should start with a careful analysis of resource potentialities of the environment and of the socially defined basic needs. This should lead to a great variety of specific solutions based on appropriate technologies instead of uniform ones.

For this reason, it is necessary to accord greater importance to physical and material aspects of development, as opposed to information, analysis, estimation and objectives formulated in monetary terms, which nevertheless remain valuable for certain aims within the multi-objective approach. Thus new degrees of freedom may appear in respect of the use and management of space and resources, which are otherwise often relegated to the rank of residual variable by an approach imposing universal techniques

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28/ See I. Sachs, op. cit.

29/ The ecodevelopment approach tries to carry out such a harmonization process in various concrete situations. See the "Ecodevelopment studies" collection of CIRED in collaboration with Unit of Documentation and Liaison on Ecodevelopment of the Maison des Sciences de l'Homme (Paris), with the support of UNEP. See also Ecodevelopment News published by the same institutions.

and a rigidly defined demand. It is also necessary to elaborate social indicators of environment which would translate information on physical processes into social values, without falling into the straits of monetary evaluations (see section V).

An effective adaptation to diversity and specificity of the conditions and problems of the environment require also the establishment of a new balance between local and central levels in the planning system; the identification of the problems, seeking of solutions, the evaluation of technical alternatives and the follow-up of operations requires the active endorsement of individuals and groups at the local level and should not be the exclusive domain of central planning, despite the problems that arise as a result of the frequent lack of qualified manpower available at the local and regional levels.

These key dimensions of the problem of integrating environmental considerations into development planning have important implications for the general structure of the planning system.

IV. IMPLICATIONS OF INTEGRATING ENVIRONMENTAL CONSIDERATIONS FOR THE GENERAL ORGANIZATION OF A PLANNING SYSTEM

It is neither feasible nor desirable to sketch a general model for the organization of a planning system. However, it is possible to clarify some important problems of planning structure posed by considerations of the environment. The following aspects will be examined:

a) The relationships between sectoral planning and the need to implement a contextual and multi-sectoral approach to problems;

b) The relative significance of, and relationships between, the various subnational planning levels;

c) The relationships between planning and management of development with regard to environmental problems;

d) The appropriate ways to encourage individuals and public institutions to take account of the environment.

1. Sectoral planning, integration needs and the contextual approach

One of the most important and common causes of environmental problems derives from the partial and sectoral character of resource and space use. One element or aspect of the environment becomes conceptually and administratively isolated from the background with which it is intimately associated. As a result potentialities are worthlessly dissolved: the various uses to which a resource or a space may be put come into opposition; one use may hinder others. Also, the compounding of unco-ordinated actions may lead to a process of degradation. If a set of optimal criteria within sectors of activity or programmes are too narrowly defined they lead to a limited degree of over-all efficiency, a waste of existing or potential resources and the general alteration of the environment. Thus it would seem necessary to reconsider sectoral structures and complement them by integratory and multi-sectoral ones which are either purpose-oriented (e.g. with respect to resources, health, etc.) or oriented to specific spaces or problems. Integration along these lines is designed to avoid partial parallel aims leading to the externalization of the environment; such an integration can be sought in various ways.

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One serious possibility consists of endowing development projects with several objectives corresponding to respective socio-economic and environmental impacts. It amounts in fact to stressing the importance of integrated development projects and blurring the distinction between projects that are "economic" and those that are "social", or again "environment enhancing".

A second related possibility consists of upgrading the importance of the intermediate level between the over-all plan and individual projects, i.e. that of programmes. But this approach must go beyond the narrow financial perspective with which programmes are commonly imbued. The relations between projects must be co-ordinated, with iterative adjustments between projects and programmes being conceived in such a way as to permit the progressive integration of all of the pertinent dimensions. Thus, a single project could correspond to various programme types according to different needs of integration:

a) Technological: sectoral programmes dependent, for example, on various technological alternatives in order to satisfy a set of objectives with respect to production, accumulation, employment, income distribution, technical training, control of a technological domain etc.;

b) Spatial programmes incorporating several projects and activities; these programmes are geared to making compatible and complementary the different projects and activities and to establishing the necessary flexibility in land use patterns; 30/

c) Multi-sectoral programmes geared to meeting certain over-all planning objectives, e.g. with regard to considerations of importing energy or seeking the ecologically viable exploitation of local resources;

d) Inter-activity programmes based on complementary relationships of the input-output type, or related to the pooling of certain activities or certain supporting apparatus.

Among these various types of programmes the second and the third are clearly the most important from the point of view of environmental considerations.

A third possibility consists in attaching to the existing planning structure ubiquitous "cross-pieces" between and among levels which are intended to fulfil both co-ordinatory and information circulatory tasks and which stimulate the sectoral structure. Such structures should in this way progressively invest the sector-based configuration with a permanent

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30/ Many integrated development programmes are, apparently or really, of this type, when they embody several projects of a region (see the many like-T.V.A. development programmes).

preoccupation with considerations of the environment. This was in part the basic conception of the original French Ministry of Environment which has simultaneously sectoral responsibilities (pollution, over-all water management, etc.) and mission-co-ordination tasks towards sectoral administrative departments (Industry, Agriculture, Health, Public Works, etc.). For these tasks the Ministry had no executive responsibility. Another example would be a corps of environmental "general inspectors", having authority from the top to investigate and to recommend corrective actions inside sectoral department activities. But such a task can only be profitably executed if the discretness of this structure is compensated for by according it with sufficient status and a reasonable fund of resources for use as financial incentives.

The first two approaches can also be adopted using various institutional devices. However, it would be difficult to envisage how widespread horizontal integration could be undertaken without strengthening local and regional forms of planning, even for the execution of projects or programmes of national scope. It must also be realized that there are serious difficulties in assigning responsibility for integrating all relevant planning dimensions to a single organization (e.g. agency, public enterprise, sectoral bureau) which has traditionally carried a rather narrow brief; the consequence would inevitably be the dominance of one point of view over the others. An example would be the assignment of all questions pertaining to the rural environment to an agency hitherto responsible only for water management. A better solution would be to establish joint responsibilities among various sector-oriented organizations representing several points of interest, and to foster co-operation among them if there is a risk of a weighter organizational structure resulting, with certain internal rivalries.

Whichever solution is adopted - and these approaches are not mutually exclusive - the comprehensive integration of environmental considerations requires a contextual approach.[31/] This approach recognizes the interdependencies that exist between the activities of separate sectors. In practice the realization of the objectives of one sector depend as much on the performance of other sectors as on its own performance. The contextual approach to environmental problems thus consists in elucidating the environmental policies that are implicit in the various sectoral options, in locating the key factors,

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31/ F.R. Sagasti, "Towards a new approach for scientific and technological planning", Social Science Information, vol. XII, no. 2 (April 1973).

in analysing the possible contradictions between implicit policies and explicit environmental objectives, and in specifying the alternative contextual courses of action required to head off or soften these contradictions.

2. Relationships between territorial planning levels

The specificity and diversity of environmental problems confer great importance on regional and local development planning. Decisions made at the national level should not be permitted to inhibit the freedom of action that is necessary at regional and local levels to effectively take the environment into account. This is the reason why the consideration of the environment itself leads to the establishment of new relationships between levels and ipso facto to a reconsideration of which decision-making levels are the most appropriate.

The problem of the relationship between planning levels is often tackled through an adjustment in the degree of decentralization. The centre has the responsibility for the decisions that are important in terms of either the range of consequences or the resources involved, while at the local level only those decisions having local consequences are made. Applying this approach to environmental problems would lead to a distinction among decisions having environmental consequences: according to the nature of the consequence, decisions would be considered either at local level, or at the other various intermediate levels, or at the central level.

The previous remarks on specificity and diversity of environmental problems could be thought to imply that the environment is principally or exclusively a matter of local interest. But complete decentralization is inappropriate. In practice, many decisions have consequences at local, regional and national levels together. For such decisions the problem is not one of knowing at which level to assign responsibility but rather by which means the different planning levels may be co-ordinated in order to ensure that the decisions take account simultaneously of the interests of the local, regional and national levels. Furthermore, in spite of the diversity and specificity of environmental problems, their consideration requires an integrated approach over and above partial viewpoints that are sectorally or geographically-based. The linkages between ecological structures and the spatial breadth of interdependencies also imply a comprehensive treatment, especially for resources management, which facilitates the articulation between the local and central levels.

A good example of all this is provided by water resources management. One one hand, many problems (deforestation of slopes, silting up of dams, etc.) have to be considered at a high level - the basin scale,[32/] which may imply international co-operation, as in the case of the Mekong River. On the other hand, some management problems can only be tackled at a local level (waste disposal facilities, drinking water) in spite of the fact that all decisions, at whatever level they are made, have to be co-ordinated and harmonized. In that case, what are needed most are means of vertical and horizontal co-operation between the various agencies and parties concerned at the different levels.

This leads to a recognition that each level has an integrative function to perform and that any one of these levels cannot be eliminated. Only a multi-level planning structure permits the integration of environmental considerations. There should be thus a process of two-way consultative exchange and bargaining in the harmonizing of the viewpoints of different levels and this process should preside over their relationships. One aspect of this process concerns the drawing up of development projects and programmes.

Such an approach contrasts with the hierarchical approach often proposed, which amounts to an abnegation of the specific concerns of each level, with the interest of lower levels becoming absorbed in the criteria of satisfaction at higher level.[33/] Socio-ecological systems should be considered as only partially hierarchical in this regard.

It might be asked whether there is any single subnational planning level that is the most appropriate for environmental considerations. While this cannot be so a priori certain problems should at least favour certain levels. Two considerations are pertinent in this regard:

a) The idea of a "problems space" designating the areas englobing the principal factors constituting a specific problem;

b) The idea of a "solutions space" designating the areas within which solutions to the problems may be sought.

The more these spaces can be made to overlap the greater the possibilities of overcoming the problems. In any case, the "solutions space" must be sufficiently large and formally defined in terms of institutions to allow practical

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32/ Many countries have adopted the basin level to integrate water management. This is the case in France where water basin financial agencies are the main policy-making level, although river basins are not of the same scale as some of those in Asia.

33/ Y.Y. Haimes and D. Macko, "Hierarchical structures in water resources system management", I.E.E.E. Transactions on Systems, Man and Cybernetics, vol. SMC-3, no. 4 (July 1973).

margins of freedom for the choice of solutions.[34/]

On the basis of these ideas of "problems and solution spaces" and in conjunction with notions of the time dimension of resources themselves it is possible to address the question of the most appropriate level to tackle one problem. That level itself depends on the nature of each problem and it is not possible to have a unique territorial structure equally good for all problems. But in all events there must be sufficient procedural co-ordination and co-operation to allow for aspects which inevitably may fall outside the solution space associated with the planning territorial structure, however well that structure is defined. Different institutional forms may be used to ensure such complementary procedures, such as civil law associations, commune syndicates, inter-district representative groups, and interregional commissions.

3. Relationships between planning and management for the consideration of the environment

There is often an incompatibility between development planning and day-to-day administration or management. Much effort is devoted to evaluating the returns on investments but little is given to follow-up activities or to the subsequent functioning of the means of production created. In particular the problem of environmental impact is rarely the object of permanent follow-up comparisons with projected results. Seeing the need for considering the environment from the point of view of long-term development conditions, and in view of the fact that the process of environmental transformation derives as much from on-going actions as from broader decisions of future relevance, encourages the hope that this incompatibility between the planning of new projects and the management of on-going ones will be resolved, leading to a revision of the existing conditions. To achieve this aim, post-audits of environmental impacts should be systematically instituted, made up of:

a) A permanent collection of information about the environment conducted by the project authority and aiming mainly at further adjustments of the project to tackle unforeseen impacts, with appropriate means;

b) Periodic controls by independent public "inspectors" verifying the appropriateness of the information system and of the adaptive steps of the information;

c) Scientific inquiries aiming at increasing knowledge.

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34/ For example, there are virtually no solutions to the problems of coastal areas in which conflicting pressures are intense, as between resource conservation, industrial and urban development etc., if the "solutions space" is to be defined by a stretch of one kilometre. In such a case it would be necessary to include the hinterland in the "solutions space".

In the traditional conception, management proceeds directly from planning, being the execution of it. In the perspective of integrating considerations of the environment, the planning of development operations must be incorporated into a larger framework of permanent space and resources management, aiming at the quality of the milieu in its natural and man-made forms. The purpose of management would be to ensure in the long-term the reproduction of ecological conditions for social development, as well as to provide the resources and environment of quality able to satisfy the current needs of the population. This framework should account for the environment at the strategic level i.e. in maintaining ecological diversity, allowing for future options, flexibility, ecological prudence and so on. The utility of individual projects must be determined as the result of assessments regarding their appropriateness to the management conditions governing interactions between human activities and natural processes.

Clearly this perspective requires the establishment of an over-all institutional framework governing interactions between man and nature. This framework would not be subordinate to the development planning framework but closely interwoven with it. It would also consist of a multilevel structure comprising local and central levels with emphasis given to an intermediate level which may be termed regional, and which is able to take account of the diversity and specificity of environmental conditions as well as the inter-dependencies among problems.

4. Appropriate policy-instruments

Concrete socio-economic development and the evolution of interaction between social and natural processes do not occur by themselves, but depend on the outcome of numerous decisions made by public and private economic interests acting collectively or individually. The ability of development planning and the suggested management structure to take environmental considerations into account depends on the means that are at the disposal for governing these various interests for this purpose.

Economic discussions on the subject tend to put the emphasis on financial instruments (taxes, subsidies, fiscal allowances, interest examption, etc.)[35/] because they are easily integrated into the market system. Their effectiveness depends on the actual mechanisms that regulate the behaviour of

/interests

35/ R. and N. Dorfman, op. cit. and W.J. Baumol and W.E. Oates, The Theory of Environmental Policy (Englewood Cliffs, Prentice Hall, 1975).

interests groups, and on the sensitivity of these groups to the instruments. Experience suggests that these instruments may prove useful when applied to widely monetized sectors and when they are inserted in a set of substantive actions aiming at the transformation of what we have called the "context". In that way, their regulatory role is oriented towards specific substantive transformations and may defuse potential "intrinsic" externalities. For example, the efficiency of taxation depends on the economic context (elasticity of demand and supply, degree of monopolization of the sector concerned, importance of technical factors, etc.). So it may seem judicious to tie taxation for example to a specific effort of research and development aiming at new no-waste technologies. The scope of free adaptation of individual actors is thus delimited. In other cases, such instruments are quite inappropriate (e.g. for problems of health) and have to be substituted by administrative actions.-

However, the choice of means to employ should not be a question of doctrine. In mixed economies, the whole set of familiar public instruments may be used: legal, administrative, fiscal, para-fiscal, credit, and so on. In any case it is desirable that some specific means be applied within the field of action defined by the prevailing set of prohibitions.

It is pertinent to emphasize the special importance of those measures which have the effect of extending the time-horizons of the various actors and reducing the pressures from problems of short-term survival and individual uncertainties about the future. In the same way, it is important that people making efforts in order to improve the quality of the environment and of resources management be guaranteed some future advantages as a result.

One of the most potentially interesting courses of action is the establishment of what might be called "contract-programmes" between the various private or public interest groups involved, representing the local and central levels. The aim of these environment-oriented programmes is to harness the active co-operation of all parties and permit a structure of concertation and negotiation which allows for compensation, and to arrange contractual obligations establishing each party's contribution. This solution allows for much flexibility and unlike an approach which sets norms and

/regulations,

regulations, it facilitates a good adaptation to specific conditions and problems. It also has the important advantage of giving substantive orientations to the regulatory system. Certain may fear that such "contract-programmes" result in the dominance of powerful vested interests. In fact there are no particular reasons why this should be more so for this than for any other instrument. Experience suggests that even administrative regulation-setting is subject to pressures and bargaining. On the other hand, such "contract-programmes" have proved efficient in many place e.g. in France for the planning of anti-pollution devices in industrial sectors or for local land-use and environment activities.

Considering now the institutions for the over-all management of resources and the environment, their potential ability to adopt long-term perspectives as discussed above depends on their maintaining a relative autonomy vis-à-vis institutions of development planning, and above all, on financial independence which is not subject to annual budgetary whim. This can be obtained by allowing these institutions to have autonomous financial sources or by giving them a budget defined by a fixed percentage of the over-all public budget.

Finally, it should be noted that certain juridical possibilities with long-term implications may be applied in certain cases such as the reserving of certain areas, the establishment of long-term binding obligations, and requirements to restore sites after use, e.g. in mineral exploitation.

The adequate functioning of such planning and development management structures in regard to environmental considerations depends to a high degree on the availability of adequate information on the environment, on environmental effects, and on social preferences about the environment. These aspects will be examined next.

V. INFORMATION NEEDS AND STRATEGIES RELATED TO THE INCORPORATION OF THE ENVIRONMENT INTO PLANNING

The information needs related to the incorporation of the environment into planning are considerable and difficult to satisfy. An insufficient knowledge of the environment, of the interactive ecological processes, and the degree of uncertainty regarding the ultimate consequences of numerous disturbances and degradations are obvious problems. But they are not the only sources of difficulty. The nature of environmental problems themselves arising out of the interactions between natural and social processes demands a need for information concerned with this interaction: the socio-economic consequences of environmental transformation and the social mechanisms through which environmental problems are created or amplified. The difficulty derives from the need to grasp the interplay between social and natural forces. A kind of specific information is required which is not simply the juxtaposition of socio-economic information and information on the natural states and processes.

A further difficulty relates to the fact that the required information must be adapted to the needs of development planning and management even though there is no spontaneous connexion between the various scientific disciplines and the needs of planners and managers.

Finally information systems have to be appropriate to the characteristics of less developed countries: the scientific and technical means available may be limited; basic knowledge is often lacking; the learning process is part of the development process itself and so is the information about environmental impacts which can only be progressive and develop from trial and error in development experiences.

These observations imply the necessity of formulating a specific information strategy including various axes of development. The following features are to be understood as the main ideal directions, which is not to suppose that they can be realized at once. It is clear that the most urgent information needs are those pertaining to development operations and it is on that basis that information systems should progressively be organized.

The three main features of an information strategy, as elaborated below, are:

a) The development of information procedures for the elaboration and analysis of regional plans and development programmes and projects;

/b)

b) The development of an over-all information system which is both descriptive and prospective and which corresponds to a contextual approach to the incorporation of environmental considerations into a definition of development patterns;

c) The development of scientific knowledge of the environment and the social mechanisms that transform it.

1. Environmental information for specific development projects and programmes

An information strategy necessarily aims at long-term results, i.e. the establishment of a coherent and appropriate information system about the environment. Integrating the environment into development planning cannot afford to wait for its establishment. Immediately available information is required, formulated in terms relevant to the planner. These conditions imply that in parallel with the task of increasing scientific knowledge of the environment (see next subsection), steps should be taken to guide environmental studies from a planning viewpoint.

Two types of environmental study may be distinguished in this regard:

a) Prospective studies preceding the conception of a regional plan or of a programme or project of development; these studies are designed to orientate the conception of development operations;

b) Environmental impact studies designed to evaluate the consequences of an already defined plan, programme or project; their feedback should permit the conception of development operations to be adjusted or a better choice to be made among options and variants or clearer decisions to be taken as to whether or not to carry out a particular operation.

Prospective studies should encompass:

a) the appreciation of existing and potential resources, which could be brought into use or mobilized for future development;

b) the identification of constraints of limitations that must be accounted for;

c) the gauging of aptitudes of various spatial units for various uses or activities;

d) the drawing up of a table of complementarities, compatibilities or incompatibilities between possible uses of resources and spaces; this table would be related in particular to the nature of the impacts of these various uses on the environment.

These studies should be especially useful in elucidating the question of location[36/] and of modes of resource use. It should be noted that in certain cases only an integrated mobilization of the various resources in a particular area, allowing for complementarities, can render activities

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/economically

36/ I.L. Mc Harg, Design with Nature, (New York, the Natural History Press, 1969).

economically viable - for example, the integration between cattle-raising and silviculture. Also, these studies cannot be conceived only as the identification of natural features. They should also throw light on the initial social conditions pertaining to the occupation of space and the use of resources, as well as to the prevailing social patterns of production and the importance implied in the environmental conditions and in the current use of resources for economic survival and the satisfaction of the basic needs of various groups in the population.

Impact studies normally comprise four logical steps:[37/]

a) Inventory of the initial state of the environment;

b) Analysis of current processes and trends, giving an idea of the evolution of the environment in the absence of the development activity to be considered;

c) Identification and evaluation of the impacts of the activity; this analysis should specifically identify the population groups affected so as to draw up an estimate of the importance of the impact by groups and by individuals;

d) A set of recommendations on the advantages and disadvantages of the available options from the environmental point of view, on the modifications to be made to the conception of the activity, or on the complementary measures to be taken to limit the negative impacts or afford real compensation to those groups of the population adversely affected.

These two types of study must be carried out by specialists in close liaison with planners to allow for a permanent adaptation of the terms of reference and of the information needs, particularly for the first type of study. Also the approach to the environment should be conducted in two phases.

In the first phase three objectives must be sought on the basis of existing information and brief studies:

a) Sketching the general framework and its broad features, i.e. geomorphology, pluviometry, winds, soils and resources, land use, etc;

b) Identifying gaps in knowledge requiring further research, with special emphasis on those which are of high priority for planning;

c) Locating the sensitive aspects of the environment and the likely points of rupture in the equilibria.

In the second phase, a descriptive approach, which cannot be exhaustive should be foregone[38/] in favour of a more selectively oriented approach. This implies the need to search for information defined in forms pertinent to the

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37/ R.E. Munn ed., Environmental Impact Assessment: Principles and Procedures, Report 5, SCOPE-ICSU, (Toronto, 1975).

38/ Many environmental impact studies are filled with static inventories of limited usefulness.

evaluation of aptitudes and of the limits for the various uses envisaged and for evaluation of compatibilities, complementarities, or incompatibilities.

Normally these two types of studies have their own specific roles, and it is their combination which permits an effective integration of the environment into development planning. In fact, impact studies are often given greater priority than prospective studies. However, basing considerations of the environment only on impact analyses presents some important problems.

In the first place, it encourages a project by project approach which is not capable of elucidating interactions between the impacts of several projects or of apprehending more general effects (synergistic and cumulative ones). Impact analyses must thus be part of a more general approach which encompasses several levels of planning.

Secondly, in order to be efficient, the "retrospective" approach of impact studies requires the conception of development activities to be very flexible so as to allow for modifications in the light of the results of these studies. Given the efforts involved in the preparation of projects and plans, and political pressures, however, there is often much resistance to their revision except on a marginal basis. The preparation of variants is not a sufficient solution for it may prove that none is satisfactory from the point of view of the environment. Also it must be recognized that measures based only on the findings of impact studies accord often with an implicit hypothesis that integration of the environment requires rather marginal adjustments, as opposed to possibly fundamental modifications in the conception of development activities. It is worth stressing again the importance of conceiving projects and programmes which can be progressively realized stage by stage without large indivisibilities and adapted in the course of execution on the basis of information on impacts at successive stages.

Much analysis has been devoted to methods of evaluating impacts on the environment without there being a clear explanation of the meaning of these methods in relation to decision-making procedures. The commonly expressed need to employ a single unit of measurement for all costs and benefits would not seem to be a sufficient reason for falling back on a monetary evaluation of all impacts on the environment. The institutional decision-making procedure is better clarified by a disagregated scheme which specifically describe the impacts in real terms by population groups. Of course, when the impacts have financial repercussions they must be evaluated in financial terms, and this goes for all consequences of an

economic nature. But it is clear that reckoning in these terms should not be intended to reflect the total social evaluation of these impacts and is only one factor in the over-all assessment made in accordance with the general criteria that guide the over-all strategy of incorporating environmental considerations.

2. Towards an over-all prospective-oriented information system

Since the "contextual" approach of the integration of the environment questions the various components of development styles, the information strategy must contribute to situating the status and evolution of each component with respect to the environment, whether it concerns consumption patterns, production techniques or the use of space.

To meet this requirement, it would be useful to set up progressively a system of social accounting for the environment comprising the following:

a) Accounts of natural patrimony including the status of mineral and biological resources and spaces of scientific, esthetic or cultural value;

b) Accounts of flows of materials and energy, associated with resources utilization, waste and pollutant emission, and the availability of use values for the satisfaction of needs. These flow accounts should permit an estimation of the energy content by source of energy and of the material content of the composition of consumption and of productive goods. They should also permit an estimation of the proportions of total resources consumption accounted for both by the production of goods and by their utilization. As far as possible these accounts should be drawn up on a geographical basis that approximates to the ecological distribution in order to be able to establish more easily the link between the recognized set of flows, the evolution of natural patrimony and the set of processes of evolution or transformation;

c) A set of indicators of the natural environment which describes along the lines of territorial breakdown compatible with that adopted for the flow accounts, the status of the environment and the current processes of transformations (in respect of, for example, changing plant coverage, the transformation or disappearance of aquatic fauna and flora, pollution or chemical degradation of the soil, and changing patterns of land occupation). If the flow accounts are intended to evaluate withdrawals and waste, these environmental indicators should show the dynamic consequences of human activities on the environment. This system of indicators should also permit classification of spatial units considered according to levels of ecological risk arising either out of specific ecological sensitivities, or out of particular vulnerabilities to natural disasters (seismic, flood and desertification risk etc.);

/d)

d) A set of social environmental indicators which conceives of the environment in terms of man's over-all habitat, i.e. conditions of access to resources and space, sanitary and housing conditions etc. These indicators would be specified by population groups;

e) Economic environmental accounts evaluating inputs of manpower and resources devoted directly to the protection or improvement of the environment or to the management of resources, and which also estimate, as far as possible, the levels of costs associated with options least damaging for the environment that are acceptable. As a counterpart to these accounts, there ought also to be evaluated the environmental benefits resulting from these efforts at protection and improvement, even though in many cases economic estimations may be difficult.

This social accounting of the environment should be complemented by more narrowly defined studies with sectoral or local perspectives on the relationship between the environment and the main features of the development strategy, e.g. monographs on agricultural techniques, on modes of resource management etc. The analysis of the real impacts (audits) of completed or on-going development projects on the environment would here be of great value and should be undertaken in a systematic manner, as it has been already mentioned.

Finally, over-all development planning would be helped by a specific type of information in order to make meaningful decisions of consequence (so-called "décisions lourdes"[39/]) which ensure sensitive mutations in development styles and which leave their mark on the social, economic, technical and material content of these styles. These decisions might, for example, be concerned with the growth of automobile transportation, the introduction of nuclear sources of energy, or green revolution techniques, the spread of the market economy in rural areas, or on land reform.

Such groups of decisions have social and possibly environmental effects which are more than marginal and often complex, resulting from a combination of numerous factors and induced changes. They thus call for information of a prospective nature which elucidates a whole range of consequences and which is not confined to a narrow analysis of the economic balance. It is to this requirement that "technology assessment" provides the answer; conceived to clarify major technological options "technology assessment" has become gradually elaborated so as to serve as an analytical instrument of complex social problems.[40/]

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39/ P. Lagadec, Les Dossiers de la Nouvelle Croissance: Décisions Lourdes et Environnement, (Paris CIRED. Secrétariat Général du Haut Comité de l'Environnement, Ministère de la Qualité de la Vie, June 1976).

40/ F. Hetman, La Société et la maîtrise de la technologie, (Paris, OCDE, 1973); and Revue Internationale des Sciences Sociales, Numéro Spécial, "Evaluation sociale de la technologie", vol. XXV no. 3, April 1973.

In the perspective of the integration of the environment into development planning it is useful to build such analyses around four types of problem area:[41]

a) Analysis of a social oriented "mission" (e.g. nutrition), or of a problem (e.g. coping with natural disasters);

b) Analysis of technological paths;

c) Analysis of resource sets;

d) Analysis of a spatial complex.

3. Programmes of scientific knowledge about the environment

Basic knowledge is a general condition for improving planning and it involves the development of various scientific disciplines. However an attempt must be made to build up comprehensive knowledge of the capacities and workings of the various systems (e.g. geomorphorlogical, hydrological and phyto-ecological), so as to build up an over-all and systemic ecological knowledge which takes account of the total functioning of eco-systems.

Knowledge of the environment, moreover, should go beyond knowledge of the natural habitat to fully comprehend the interactions between man and nature. For this reason, it would seem desirable to undertake a set of monographs on situations that are contrasted in terms of socio-economic and natural conditions. The purpose of these studies would be to elucidate the various regulating mechanisms which ensure that certain societies succeed in reproducing their habitat and their kin, and the social factors or transformations which partially inhibit the full workings of these mechanisms. Some basic material already exists in monographs established by anthropologists and geographers (such as those on the nomad pastoralists of the sahelian region). But what is new at stake is the systematic reappraisal of this material. It is worth noting that some geographer propose to redefine geography in this way.[42]

VI. THE FORMATION AND EXPRESSION OF SOCIAL PREFERENCES: TOWARDS PARTICIPATION PLANNING

The question of social preferences is one of the most delicate. Analysis of economic propositions about preferences in this context well illustrates the ambiguity of the question and the way it can be manipulated. How for example is the relative influence to be determined between on one hand genuine values or choices and on the other, those whose expression emerges from social structures within which the positions of power, material

/wealth

41/ O. Godard, et al., 1975.

42/ J. Tricart, L'Ecogéographie, Paris, Ed. Hérodote, 1979.

wealth and access to education are profoundly unequal? There is an ill-defined borderline between the revealing of preferences and their manipulations.

For that reason, social preferences can on no account be considered as an exogenous assumption for planning purposes. Information and the elaboration and expression of social preferences represent one of the most important tasks that to be undertaken. Since market behaviour, for reasons noted above, is an insufficient basis for the orientation of development planning and particularly for the incorporation of environmental considerations, the elaboration of social preferences, except if they are a priori considered to be expressed by the choices of the existing political and administrative decision-makers, can only be brought about through the widest possible participation of the population in the identification of problems and needs, in the definition of priorities and in the choice of options.

In addition to the respecting of democratic principles (which is more than a minor consideration), and in addition to its function of elaborating social preferences, popular participation may be justified in two further ways.

In the first place participation makes possible - in so far as determination of the objectives of actions taken accords with the interests of the participants - a greater awareness of already available information and knowledge of their environment. It would be difficult in practice to have access to such information by other means. Also, participation may enhance the utilization of under- or unemployed human resources in development activities, e.g. seasonally unemployed manpower (the role of which could be crucial in carrying out activities of protection or upgrading of the environment in a short- or long-term perspective).[43/]

Secondly, participation itself embodies an educative process essential for familiarizing the participants, and their socio-economic interests, into human behaviour and thereby increases the general level of awareness about the relationships between man and resources.

However, even once the value of participatory planning is recognized, it should be noted that the elaboration of social preferences cannot only rely on a collective process resulting from the workings of appropriate

/institutions.

43/ I. Sachs, "Environmental quality management and development planning", Economic and Political Weekly, vol. VI, no. 30-32, special number (Bombay, July 1971).

institutions. It must also allow public decision-making bodies some autonomy for evaluation and action; individual preferences, in other words, cannot be the sole guide in environmental considerations.

Thus, abstracting from the problem of conflicts between the preferences of individuals or groups in the population, middle-level institutions must play a role in co-ordinating, but also sometimes going beyond, the preferences expressed at the grass-roots level. This relative autonomy of public institutions[44/] is required by some possible shortcomings of popularly expressed preferences.

In the first place it may be observed that preferences or attitudes in respect of environmental problems depend on the relationship of these problems and their solutions to the structure of society. For example, certain activities of environmental protection are perceived by the poor sectors of the population as being of gain to the rich or the landowning class. In such circumstances, preferences cannot be taken directly as planning guides.

Secondly, given the all-embracing nature of environmental problems which are beyond the control of each individual, the "assurance problem" and the "isolation paradox"[45/] apply strongly to the question of the environment. Individual preferences depend a good deal on a conviction that the preferences of others are similar especially where there is a need of a collective organization. In this case, collective preference expressed by an institution preempts individual preferences.

Thirdly, there is a marked difference between a "needs logic" approach and an approach guided by popular preferences. "Needs logic" is defined in absolute, and preferences in relative terms. Hence for example, if it is observed that the poorest groups manifest weak preferences in favour of the environment, it cannot be deduced that they have no need for a healthy environment, or indeed that their need is any the less than that of the better-off. Furthermore, the concept of needs - despite the difficulty of concrete definition - tends to be objective while preferences are by definition subjective, depending on psycho-sociological and cultural conditions which may be the expression of individual or collective liberty, as well as alienation. The real difficulty is determining priorities on the basis both of preferences and of needs.

/Finally,

44/ Which does not however mean exemption from all democratic control.

45/ A.K. Sen, "Isolation, assurance and the social rate of discount", Quarterly Journal of Economics, vol. 81, 1967.

Finally, and this is a standard observation, the temporal horizon of individuals and groups in the population is unlikely to be the same as that which should be assumed for collective future welfare.

In view of the above, the incorporation of the environment into development planning must be, as in other areas of decision-making, the outcome of pressures from public decision-makers, the preferences and needs of the population, and the conflicting interests of social groups.

However participatory planning can also be conceived as a means of changing power relationships in a way that favours the interests of the population and notably those of the least privileged. Among the key factors is making available to the population appropriate information on environmental problems, corresponding to their areas of concern. In this particular respect many proposed methodologies for environmental analyses or impact studies are basically insufficient because of the high level of technical sophistication they assume.

To conclude this examination of some of the methodological and institutional problems posed by the incorporation of the environment into development planning, certain priority actions may be highlighted:

a) Evaluations must be carried out on the impacts on the environment of completed projects or programmes of development, by type;

b) The widest possible information should be gathered, analyzed and disseminated on the practical options available for the conception of products and techniques;

c) There should be devised and diffused basic methodological guidelines to tackle in a practical manner and in a perspective assumed by this paper, the various types of problem arising out of the interface between the environment and development;

d) Institutional means should be systematically tried that permit wide popular participation, the horizontal integration of development, adaptation to the specific conditions of the environment and the establishment of contractual relationship between the socio-economic interests concerned.