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LAND AND WATER POLICIES IN THE ARAB REGION

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ABBREVIATIONS

BCM	Billion cubic metres
ESCWA	Economic and Social Commission for Western Asia
FAO	Food and Agriculture Organization of the United Nations
HA	Hectares
IFAD	International Fund for Agricultural Development
MCM	Million cubic metres
O and M	Operation and maintenance
PDRY	People's Democratic Republic of Yemen (former)
UNDP	United Nations Development Fund
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
WUA	Water Users' Association
YAR	Yemen Arab Republic (former)

SUMMARY AND CONCLUSIONS

1. The predominance of arid and semi-arid land in the Arab region has traditionally been a compelling reason for concern about food security. The physical limitation on land and water resources indicates that horizontal expansion of agricultural production is a limited option in the Arab region. In the past, the de facto land policy in the Arab region was geared towards agrarian reform, complemented in a few countries by land reclamation and soil conservation. At the same time, water policies were synonymous with expansion of irrigated areas, investment in irrigation and construction of drainage networks.

2. Initial increases in water supply for irrigation contributed immensely to bringing in more irrigated area under cultivation and increasing agricultural production. However, land and water policies, together with economic and financial policies, have contributed to a rate of depletion of land and water resources in many countries of the Arab region; such policies were not sustainable in the long run. Although it was difficult to predict the long-term environmental impact of policy measures, the concept of natural resource valuation was not incorporated into conventional economic analysis since natural resources were perceived to be abundant and free. For example, land reforms to improve the distribution of land resources could not adequately anticipate the adverse impact of fragmentation, over-exploitation and soil degradation at the time of their inception. Irrigation projects focused on expanding irrigated areas without being accountable for the associated rise in the water table and in salinity. Lack of demand management practices in the past also contributed to low efficiency in water use and consequent waste. In addition, improvements in the availability of water stemming from the introduction of high technology in the past diverted attention from demand management and reduced emphasis on low-cost alternatives such as improvement of efficiency, conservation and reduction of waste through maintenance of irrigation infrastructure.

3. This paper presents a regional overview of the land and water policies in the Arab region. Current policies and issues indicate that considerable progress has been made in recent years in increasing the efficient use of both land and water resources. Supply-side and demand-management policies such as land and soil conservation and augmentation of supplies (through reallocation, desalinization) are currently being adopted in many of the countries.

4. In the ongoing peace process in the Middle East, renewed importance is being given to the subject of international treaties within the context of regional cooperation in the area of water resources. Plans to augment land and water resources must consider the marginal costs and benefits associated with the proposal.

5. It is recommended that Governments in the region continue policies aimed at liberalization of the agricultural sector by abolishing direct state intervention in production, pricing and marketing, leaving such decisions to producers and other market forces. Within the framework of a comprehensive economic strategy, policies are needed to broaden the role of the private sector through optimal use of the already scarce land and water resources, and employing the concept of comparative advantage. Food security in the future will also need to be based on increases in

agricultural production stemming from improvements in yields, cropping mix and intensities. An important component of this development strategy will be optimization of the use of land and water resources.

6. Agriculture will continue to be the prime user of water in the region. Farmers pay a low price for water in most countries of the region. As land and water are increasingly scarce resources, a link between the scarcity of the resource and the resource price would be a rational policy. Such a policy would improve efficiency in resource allocation, alleviate budget deficits and reduce environmental costs. It would not only reduce problems of waterlogging, salinity and salinization but would also reduce water shortages through demand management and avert the problem of environmental degradation.

7. In the face of water scarcity in the Arab region, considerations for sustainable development dictate that pricing of water reflect as closely as possible its long-run marginal cost. As a first step, water charges can be levied (a) to recover O and M costs plus a portion of the investment costs, and (b) as a tool to promote efficient use of the resource.

8. For development to be sustainable, the countries of the Arab region will have to manage their land and water resources to maximize the returns in the short run while protecting the natural resource base from further degradation. An integrated approach encompassing the economic, social and environmental policies, which are mutually reinforcing, will need to be pursued within the ambit of sustainable development.

9. The land and water management policies may also provide a clear regulatory framework which will enhance future prospects for developing regional trade in water within the confines of a policy environment conducive to sustainable development in the long run.

10. As a first step in demand management practices, the following price and non-price measures are recommended, based on country experiences:

(a) Reduction and eventual elimination of policies that distort well-functioning markets, such as taxes, subsidies, quotas, public investment. Improvement and mitigation of market failures such as insecure and absent property rights, unpriced resources, and externalities through intervention that improve the functioning of the market. Policy successes from the region include: (i) the introduction of water pricing in Sudan (full cost recovery); (ii) water pricing in the Jordan Valley through the use of water meters (possibility of charging a marginal price for water); and (iii) relaxing land rent controls in Egypt;

(b) Incorporation and internalization of the environmental and social effects of investment projects and sectoral and macro policies. Morocco and Tunisia have included environmental provisions in their structural adjustment programmes.

11. Incorporating environmental concerns into valuation for natural resources, such as land and water, will require a trade-off which may often not be acceptable to many of the countries, primarily because long-run efficiency achievements must be "purchased" at short-run costs. The

extent of the trade-off is the domain of the policy maker, who determines how much the society is willing to pay in terms of water use and loss in net output to minimize the degradation of natural resources.

INTRODUCTION

12. The predominance of arid and semi-arid lands in the Arab region has traditionally been a compelling reason for concern about food security. The same concern has also necessitated a conjunctive approach to land and water policies in the region.

13. The majority of the land in the Arab region is arid and desert with less than 200 mm of rainfall annually.[1/] Arable land comprises a negligible proportion of the total land in these countries. In seven of the countries in the region, arable land as a proportion of total land is less than 2 per cent.[2/]

14. Limitations on arable and rainfed areas are accompanied by scarcity of water resources in the region. Although the overall availability of renewable resources of water is 350.0 BCM,[3/] there are wide intra-regional variations in the availability of water. The Mashreq Arab countries supported by the Euphrates, Tigris, and Jordan rivers and their tributaries running through Iraq, the Syrian Arab Republic, Lebanon and Jordan, and the areas fed by the Nile in Sudan and Egypt are endowed with perennial rivers. The region of the Gulf and the Arabian Peninsula is devoid of year-round availability of riverain resources. Owing to modest rainfall, agriculture is heavily dependent on irrigation, which contributes to 75-80 per cent of the agriculture production in the region.

15. The demands placed on this modest land and water resource base by a population growing at a rate of over 3 per cent per year have been immense and are increasing. Agricultural use, urbanization and industrialization have combined to intensively exploit these natural resources, in many instances to a level which has eroded the original stock. The overarching objectives of food security precipitated by fluctuations in climatic conditions, yields and production, and the growing demand for food have led to over-exploitation of the land base and degradation of the soil. In Middle Eastern countries, desertification has become a serious problem. At the same time, treating water resources as a free good has led to inefficient utilization and waste and compounded water shortages in the region.

16. This paper presents a regional overview of land and water policies

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1/ The members of the League of Arab States are: Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, the Libyan Arab Jamahiriya, Mauritania, Morocco, Oman, Palestine, Saudi Arabia, Somalia, Sudan, the Syrian Arab Republic, Tunisia, Qatar, the United Arab Emirates and Yemen.

2/ Munthir Haddadin, "Water and Land Issues in the Near East", a report prepared for ESCWA (mimeo), March 1994.

3/ The World Bank, A Strategy for Managing Water in the Middle East and North Africa, 1993, p. 7.

in the Arab region. In chapter I, an analysis of past policies is undertaken to identify their long-term implications for sustainable development. Chapter II presents current issues associated with land and water resources in the Arab region, and chapter III presents conclusions and recommendations.

I. LAND AND WATER POLICIES - AN OVERVIEW OF PAST PERFORMANCE

A. Land policies

17. The underpinnings of land and water policies in a country are closely related to government objectives in agricultural development. Increasing food security; reducing food import dependency; acquiring foreign-exchange earnings through an increase in the exports of tradeable agricultural commodities; and raising rural incomes have all been important objectives in countries of the Arab region. Land and water policies have directly or indirectly revolved around these often conflicting objectives.

18. In the past, the de facto land policy in the Arab region was considered to be primarily commensurate with agrarian reform, complemented in a few countries by land reclamation and soil conservation. At the same time, water policies were synonymous with expansion of irrigated areas, irrigation investment and construction of drainage networks.

19. Government interventions in the form of land reforms have been implemented in many of the Arab countries in the last three decades. In many cases, lands appropriated by the Governments were redistributed to landless or small farmers. In others, Governments retained large tracts of land for agricultural production as state farms, such as in Algeria, Yemen, Iraq and Egypt. Ceilings on ownership were fixed. In the Syrian Arab Republic, the Agrarian Reform of 1958 fixed the maximum size of ownership, which was reduced further in 1980. Tenurial arrangements were revised in some countries, such as Egypt, the Syrian Arab Republic, Tunisia and Yemen; in others, cropping patterns were fixed, such as in Egypt, where the law mandated that 33 per cent of the area be devoted to cotton and another 33 per cent to wheat.[4/]

20. Land tenure has an impact on the use of land through changes in the operational size of holdings. Tenancy in the region varies from 4 per cent of landholdings in Oman to 25-30 per cent in Jordan and Egypt.[5/] Tenurial arrangements in Egypt for a long time gave the heirs of the tenant the right to inherit the tenancy on land where rents remained fixed below market prices.

21. Evolution of such practices after land reforms led to a reduction in the value of land, lowering incentives for landowners to invest and leading to sub-optimal returns. The supply response of both producers and landowners to administered rent and crop prices in Egypt led to a

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4/ M.R. El-Ghonemy, "The Egyptian State and Agricultural Land Market, 1810-1986", Journal of Agricultural Economics, vol. 43, No. 2, May 1992, p. 179.

5/ IFAD, The State of World Rural Poverty, 1993, p. 120.

reduction in the leased-out area.[6/]

22. Whereas landless peasants, tenants, and sharecroppers benefited from the distribution of land, in general, the efficacy of land policies in the region remained circumscribed owing to less than optimal implementation of land reforms, substantial state intervention in the land market through fixing of rent controls and cropping patterns, and social and cultural traditions governing tenurial land arrangements and management rights.

23. Land concentration remained high. In Egypt, despite successive land reforms, only 14 per cent of total agricultural households benefited from the reform which redistributed about 12 per cent of the total cultivated area.[7/]

24. Whereas the land reforms were successful in reducing the inequity in land distribution, they also contributed to a process of polarization and fragmentation of landholdings over a period of time. The boom of the 1970s in the region artificially raised the price of land, forcing many subsistence farmers to sell off their parcels, thus leading to polarization. In addition, inheritance laws and the regulatory framework governing ownership resulted in fragmentation of land. In the mid-1980s, more than 25 per cent of the land holdings in Sudan were on a cropped area of less than 2.5 feddans, and 73 per cent of the holdings were less than five feddans.[8/] The agricultural census of 1981 in the former Yemen Arab Republic indicated a similar trend. More than two thirds of the landholdings comprised less than one ha of land.[9/]

25. Fragmentation of land became a serious constraint to modern agriculture in the region. In Tunisia, about 50 per cent of landholdings consisted of 6-10 plots with an average size of 1.8 ha.[10/] In the Syrian Arab Republic, the total number of agricultural holdings in 1970 was 396,282, comprising 1.8 million plots of land.[11/] Reductions in land holdings per capita served to reduce household income and consumption. An off-shoot of low farm incomes was a lack of investment in—and management of—land. Despite the provision made in the 1952 land reform and subsequent laws for private investment in the reclamation of land in Egypt, private investment ranged between 4 and 12 per cent of total agricultural investment between 1960 and 1980.[12/]

6/ M.R. El-Ghonemy, "The Egyptian State and Agricultural Land Market, 1810-1986", Journal of Agricultural Economics, vol. 43, No. 2, May 1992, p. 189.

7/ IFAD, The State of World Rural Poverty, 1993, p. 114.

8/ ESCWA, Problems of Fragmentation of Agricultural Holdings in the Near East, 1985 (E/ESCWA/AGR/WG.18/4), p. 3.

9/ Ibid.

10/ Ibid.

11/ Ibid., p. 5.

12/ M.R. El-Ghonemy, "The Egyptian State and Agricultural Land Market, 1810-1986", Journal of Agricultural Economics, vol. 43, No. 2, May 1992, p. 181.

26. In the face of rapid increases in population, survival for many farmers depended on encroachment of marginal lands and intensive exploitation of existing parcels. Migration from rural to urban areas also caused a shift of fertile arable land to commercial use.

27. Soil conservation policy, at the same time, focused on erosion control. Rates of soil loss were given attention through conservation measures aimed at reducing them to acceptable levels. Extension services focused on erosion control in isolation from other agricultural improvements. Declines in soil fertility owing to physical, biological and chemical soil degradation were not considered in an integrated manner.

28. Large-scale land reclamation projects fell short of objectives owing to lack of adequate planning, inadequate knowledge of soils and weak post-project extension services. In Egypt, conversion of fertile areas to non-agricultural uses at rates higher than the rate of reclamation of additional lands decreased the irrigated arable area by 2 per cent between 1960 and 1985.[13/] The construction boom between 1975 and 1977 led to a loss of 250,000 feddans of highly fertile agricultural land in Egypt.[14/] In Tunisia and the Syrian Arab Republic there has been no net increase in cultivated land since 1975.[15/]

29. Together, all these factors contributed to an intensive use and degradation of land resources which was not sustainable in the long run.

B. Water policies

30. In the Arab region, water policies are inextricably linked to land policies and issues of food security. In the past, water policies focused on the supply-side management of water resources. Water policy was synonymous with irrigation policy, the objective being to expand irrigated areas through investments in irrigation and drainage systems. Water development projects included the construction of dams, reservoirs, well fields, canal or pipe networks. In some countries, a government policy of subsidizing the costs has encouraged the digging of wells. The Syrian Arab Republic in the last 10 years has devoted 60 to 70 per cent of its entire agricultural budget to irrigation. Eighty per cent of the new land since 1987 has been irrigated by wells supported by government subsidies on fuel for operating pumps.[16/]

31. In many countries, externalities in water sector activities resulted in the past when large irrigation investment was undertaken without providing for adequate control of drainage, resulting in

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[13/] M.R. El-Ghonemy, "Land Reform and Rural Poverty in Near East and North Africa", IFAD Working Paper No. 22, 1990, p. 13.

[14/] M.R. El-Ghonemy, "The Egyptian State and Agricultural Land Market, 1810-1986", Journal of Agricultural Economics, vol. 43, No. 2, May 1992, p. 181.

[15/] The World Bank and the European Investment Bank, The Environment Program for the Mediterranean, 1990, p. 29.

[16/] FAO, The State of Food and Agriculture, 1993, p. 254.

waterlogging and salinity in sloping and downstream areas. Improper irrigation practices were the cause of an unsustainable rise in the water table in Egypt from a depth of 15-20 metres to 2-3 metres per year.[17/] In the Syrian Arab Republic, critical contents of gypsum cover 21 per cent of the total area and 50 per cent of the fertile Euphrates basin.[18/] The middle and lower Euphrates terraces and adjoining areas are composed of soils with more than 70 per cent gypsum.[19/]

32. Whereas the expansion in the network of canals and watercourses contributed to a rapid rise in agricultural production and yields initially, insufficient maintenance led to leakages and a gradual rise in the water table which, in turn, adversely affected yields in the long run. Figure I indicates that the increase of gypsum from "low" to "high" has reduced the yield of cotton from 3.9 tons/ha to 1.6 tons/ha and in the case of wheat from 4.0 tons/ha to 1.6 tons/ha in the Raqqad area in the Syrian Arab Republic.

33. Demand management of water resources was not explicitly included in water policies in the past in most of the Arab region partly because the focus, initially, was on expanding the supply and partly because socio-culturally water was believed to be a free good.

34. Lack of demand-management practices in the past also contributed to low efficiency in water use and consequent waste. In addition, improvements in the availability of water stemming from the introduction of high technology in the past diverted attention from demand management and reduced emphasis on low-cost alternatives such as improving efficiency, conservation and reduction of waste through maintenance.[20/]

35. Water charges in the agricultural sector, which uses about 80 per cent of the water in the Arab countries, have been kept low in a bid to offset the controls on the price of the agricultural produce. The price of water is so low that in many countries it does not cover the operation and maintenance costs. With increasing water scarcity leading to rising marginal costs of an additional unit of water in the region, such a policy has not been sustainable in the long run.

36. Irrigated water charges were (and still are) typically well below full recovery levels. Subsidies on water are provided as a means of offsetting low farm incomes brought about by controlled producer prices and often overvaluation of the exchange rate. As such, pricing policies in agriculture, especially of water, are self-defeating inasmuch as they conflict with the stated objectives of enhancing food security and

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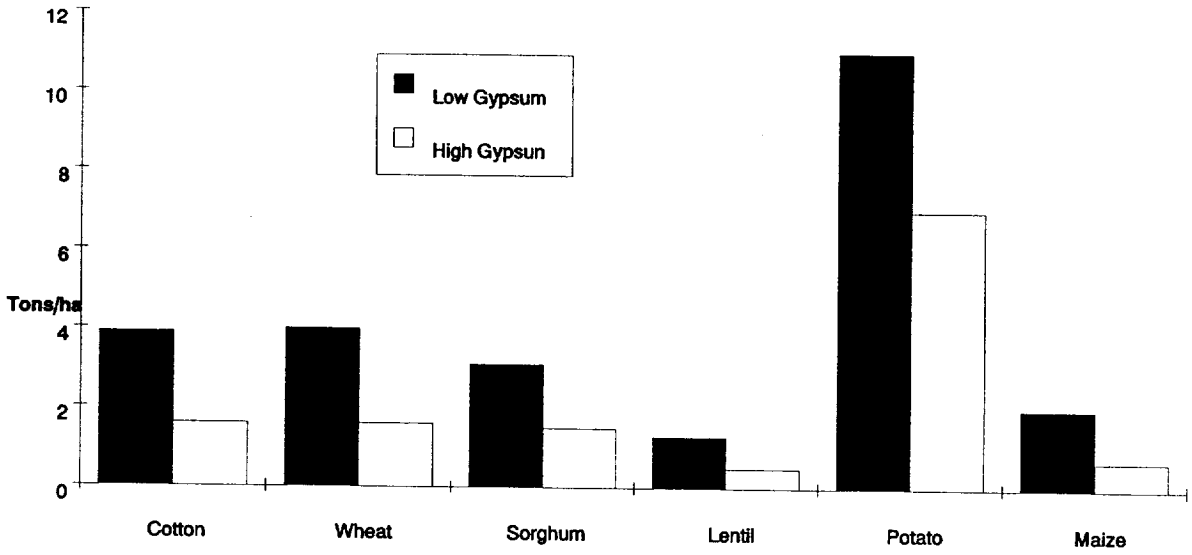
[17/] Dina L. Umali, "Irrigation-Induced Salinity", World Bank Technical Paper No. 215, Washington, D.C., 1993, p. 32.

[18/] FAO/UNDP, Syrian Arab Republic, Irrigation Sub-sector Review, Mission Report, February 1993, p. 11.

[19/] Ibid.

[20/] Hasan K. Qasahu, "Partnerships in Regional Water Resources Developments: The Technology-Innovation Imperative in the Middle East", Proceedings of the International Symposium on Water Resources in the Middle East: Policy and Institutional Aspects, University of Illinois at Urbana-Champaign, Urbana, Illinois, U.S.A., 24-27 October 1993, p. 48.

Figure I. Yield reduction owing to high levels of gypsum in the Syrian Arab Republic



maximizing agricultural exports.

C. Impact of past land and water policies

37. Although various other economic and social factors were responsible, past land and water policies in the region contributed to the trend in decreasing food security in many of the countries of the region in the short run and to an over-exploitation of the natural resource base, on which agriculture—and indeed the economy—depends in the long term. In addition, the pressure of population, which is growing at an average rate of about 3 per cent in the region, has increased the vulnerability of the economies of most countries of the Arab region.

38. The lack of incorporation of the sustainability dimension in overall policies compromised the short-term goals of food security and of maintaining the stock of natural resources in the long run. This was manifested in a number of ways.

1. Reduction in food security

39. Food self-sufficiency ratios, which relate domestic food staple production to domestic consumption, fell in all Arab countries between 1965 and 1988 (table 1). Rapid population growth compounded the problems of reduced productivity on land owing to the interplay of land and water policies in the region. Arable land per person in the agricultural

sector actually decreased in most of the Arab countries between 1965 and 1988. Per capita food production in four countries from 1986 to 1988 was equal to or less than its level from 1979 to 1981. In the Syrian Arab Republic, Egypt, the former Yemen Arab Republic and Sudan this was in part due to inefficiencies of land use, fragmentation and reduction in arable land per agricultural population. In Iraq, despite the fact that more arable land per capita was available in 1988, domestic food production of basic staples was enough to feed only 37 per cent of the population. Dependency on imports increased dramatically in Jordan between 1965 and 1988 despite increases in both arable land per capita and the amount of food produced.

40. Government interventions, in the form of controls on cropping patterns such as in Egypt, Morocco and Jordan, also led to reductions in agricultural value added and to inefficient use of water resources. In Egypt, although sugar cane and rice used 35 per cent of the water, they contributed only 14 per cent of the value added.[21/]

2. Increasing water scarcity

41. Although past water policies served to increase vastly the cultivated area under irrigation in the Arab region, the long-term result of the rapid increase in water use contributed to water scarcity. Physical limits on "mining" of freshwater were reached fairly quickly. Of the 21 countries worldwide predicted to have scarce water resources by the year 2000, half are in the Arab region.[22/] Many countries in the region, such as Saudi Arabia and other Gulf countries, Jordan and Yemen, have already exceeded—or are fast approaching—the renewable limits.[23/]

42. Groundwater resources in many Arab countries are being depleted at an alarming rate. To reduce the rate of continuous depletion, Governments can resort to measures such as taxes, assigning water rights or outright control (see figure II).

43. The policies have contributed to a lowering of the water table beyond the minimum sustainable level. In many cases it has even made further pumping uneconomic. For instance, in the northern region of the United Arab Emirates, the water table is dropping at a rate of one metre per year. The depth of wells which was at or around 150 metres in the 1980s is now over 400 metres.[24/] In Oman, over-exploitation of aquifers arising from the digging of thousands of diesel tubewells has contributed to salinization of lands.[25/] In Kufrah, Libyan Arab Jamahiriya and the

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[21/] Willem van Tuijl, "Improving Water Use in Agriculture: Experiences in Middle East and North Africa", World Bank Technical Paper No. 201, Washington, D.C., 1993, p. 18.

[22/] FAO, The State of Food and Agriculture, 1993, p. 238.

[23/] The World Bank, A Strategy for Managing Water in the Middle East and North Africa, 1993, p. 19.

[24/] ESCWA/UNEP, The National Plan of Action to Combat Desertification in Oman, 1993.

[25/] Ibid.

Table 1. Arable land, food production and food-self sufficiency in selected Arab countries, 1988

Country	Arable land per head of agricultural population (ha)		Per capita food production index 1979-1981=100	Food staples self-sufficiency ratio	
	1965	1988	1986-1988	1965-1967	1986-1988
Egypt	0.16	0.11	111	83	56
Iraq	1.2	1.35	105	98	37
Jordan	0.71	1.56	111	84	12
Morocco	0.84	0.92	106	90	82
Oman	0.03	0.03	100	32	1
Sudan	1.11	0.84	89	101	96
Syrian Arab Republic	2.28	1.68	93	100	84
Tunisia	1.4	1.5	111	81	41
Yemen (former PDRY)[a/]	0.14	0.15	85	99	59
Yemen (former YAR)[a/]	0.37	0.27	118	61	40

Source: IFAD, The State of World Rural Poverty, 1992. pp. 380-381 and 428-429.

[a/] The Yemen Arab Republic and the People's Democratic Republic of Yemen merged to form a single State on 22 May 1990.

new valley in Egypt, nonrenewable groundwater resources are already over-exploited. A restriction on well-drilling in San'a basin in Yemen is not enforced. It is estimated that over 2,500 wells are depleting the aquifers, resulting in a decline in groundwater of one to seven feet.[26/]

44. Groundwater depletion in many of the Gulf countries has contributed to desertification. Inappropriate technology; subsidized credit, which promoted the digging of wells; water costs far below the economic, or even the financial, prices; and subsidies on electricity are some of the causes which contributed to over-extraction of underground water.

45. Policies which underprice the natural resource send wrong economic signals to the farmers. The consequence, in terms of the amount of income lost to the society, is phenomenal. Figure II depicts the cost of overpumping for the "open access" case. The demand curve represents the

[26/] USAID, Bureau for the Near East, Water Resources Action Plan for the Near East, August 1993.

Figure II. Groundwater pricing

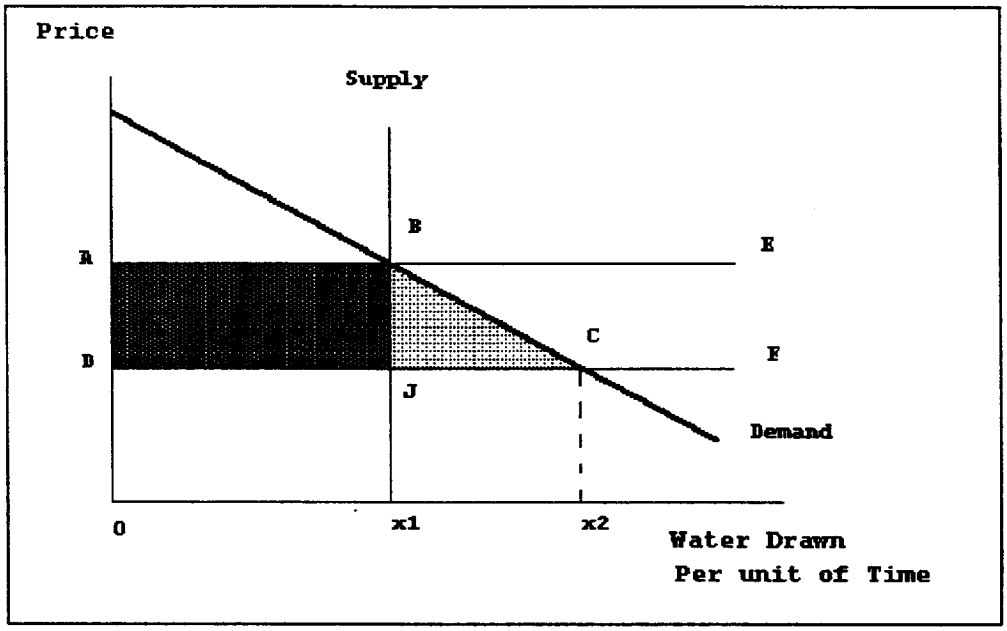

Figure 2 : Ground water pricing

farmer's willingness to pay for an additional unit of water. The natural recharge rate allows a maximum supply of X_1. OD represents the initial unit cost of obtaining the water by pumping. At this price, in the absence of control, X_2 units of water will be pumped. As water is pumped at more than the sustainable level of X_1 (pumping greater than recharge), the water level in the basin starts to fall (as is the case in many countries of the region); the result is higher costs to pump the same amount of water.

46. Under the new equilibrium, less water would be pumped (X_1) at a higher cost. The farmer is paying a price that does not take into account the user cost (or the inter-generational cost of water use). During the initial period, the user enjoyed extra benefits obtained by an off-take of water, X_2, as shown by white dotted area, but which cannot be sustained, since continued pumping would lead to extra cost, as shown by the dark dotted area. In economic terms, the discounted benefits generated in the early period would be less than the discounted cost incurred owing to the free access policy.

47. The sustainable least-cost solution in the above figure can be achieved by imposing a fee equal to the amount of AD (in the figure) on each unit of water drawn from the groundwater or creating a market for rights to draw water up to the sustainable levels of X_1. In many countries of the region free access to groundwater is resulting in inefficient use of the resource. An appropriate price policy would

require that, in the long run, marginal opportunity cost be able to ascertain the inter-generational value of groundwater depletion, a value which would take into account direct cost of resource use, its user cost and intersectoral cost.

48. Rapid population increases are expected to reduce the renewable water resource available in the Arab region. Table 2 presents forecasts of the impact of rapid increases in population on the availability of renewable water per capita in the Arab region. The table indicates that by the year 2025, most of the Arab countries will have only 32-66 per cent of the amount of water available to them in 1990. The situation with water-deficit countries, such as Jordan, Oman, Saudi Arabia, the Syrian Arab Republic and Yemen, is predicted to be worse than in others where the renewable water resources per capita are predicted to decline by around two thirds in the next 30 years. For most of these countries, supplementing water from other sources will become an ever-increasing necessity.

3. Natural resource degradation

49. Despite initial increases in land and water availability for agricultural production, policies were not conducive to sustainable development of natural resources. The exploitation of the arid and already fragile ecological environment has led to an annual loss of 600 km² of arable land in the Arab region.[27/] In many Arab countries, desertification had become a serious problem by the 1980s.

(a) Desertification

50. Table 3 indicates that in 1984, 98 per cent of the total land area in the region was affected by some form of desertification. The combined effect of water and wind erosion, salinization, and cementation affected 65 per cent of the land area of the region severely or very severely.

51. Soil erosion leads to a decrease in the capability of land and to a decline in productivity. About 42 per cent of the total land area in the Arab region is affected by soil degradation owing to cementation and accumulation of gypsum. Gypsomorphy is mainly found in Iraq, Kuwait, the Syrian Arab Republic and Yemen.[28/] According to UNEP, in the countries of North Africa, 2 million ha of agricultural land has been lost in the last 25 years owing to serious soil erosion stemming from intensive cultivation and poor management of rangelands.[29/] Topsoil covering 22,000 ha of land in Morocco and 18,000 ha of land in Tunisia is lost

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[27/] Kamal El-Batanony, "Drought and Desertification in the Arab Nation", a paper prepared for a State Information Service/UNEP Seminar entitled Information and Environmental Issues in Egypt and the Arab World, re-published in Development and Socio-economic Progress, No. 56, p. 32.

[28/] ESCWA, "The Role of ESCWA in Agricultural Resource Management and Conservation and in Combating Desertification in the Region" (unpublished mimeo), 1993, p. 18.

[29/] The World Bank and the European Investment Bank, The Environment Program for the Mediterranean, 1990, p. 29.

Table 2. Water availability per capita in selected Arab countries, 1990-2025

Country	Total renewable water resources	Water availability per capita per year (millions of m³)			Percentage reduction since 1990
	BCM/year	*1990*	*2000*	*2025*	
Algeria	18.4	731	552	353	48
Egypt	55.5	1054	845	571	54
Iraq	100	5291	3861	2041	39
Jordan	0.9	285	200	102	36
Lebanon	3.8	1418	1274	929	66
Libyan Arab Jamahiriya	0.7	154	108	50	32
Morocco	29.7	1184	935	633	53
Oman	2.0	1287	886	421	33
Saudi Arabia	2.2	156	1108	52	34
Syrian Arab Republic	5.5	438	308	151	35
Tunisia	3.8	465	376	270	58
Yemen	2.5	216	153	71	33

Source: Calculated from information in "Improving Water Use in Agriculture: Experiences in the Middle East and North Africa", Willem Van Tuijl, World Bank Technical Paper No. 201, Washington D.C., 1993, p. 1.

each year to erosion.[30/]

(b) Waterlogging and salinity

52. In the alluvial plains and coastal areas in many of the countries of the region, agricultural production is affected by salinity and an excess of soluble salts in the soil. Salinization and alkalization have affected 5 per cent of the region's land area while an additional 20 per cent has been affected by soluble salts.[31/] Most of this form of natural degradation was found in Egypt, Iraq, Saudi Arabia and the United Arab Emirates. One of the main causes of excessive water use and improper drainage in Egypt has led to salinity and waterlogging affecting 32 per cent of the Nile Delta and 30 per cent of the Nile Valley, with an

30/ Ibid.

31/ ESCWA, "The Role of ESCWA in Agricultural Resource Management and Conservation and in Combating Desertification in the Region" (unpublished mimeo), 1993, p. 16.

Table 3. Status of desertification in the ESCWA region

(Thousands of hectares)

Countries	Wind erosion		Water erosion		Salinization		Cementation				
	Slight and moderate	Severe and very severe	Slight and moderate	Severe and very severe	Slight and moderate	Severe and very severe	Calcareous	Gypsum	Total desertification	Total land area	Desertification (%)
Bahrain	-	-	-	-	-	-	60	-	60	62	96.8
Egypt	1 746	16 422	3 122	15 089	5 418	1 942	55 402	-	99 141	99 545	99.6
Iraq	1 431	635	4 691	-	1 322	6 679	16 771	8 600	40 129	43 397	92.5
Jordan	733	-	5 578	1 846	106	74	1 124	161	9 622	9 718	99.1
Kuwait	421	-	-	-	-	209	379	591	1 600	1 782	89.8
Lebanon	-	-	858	-	-	-	68	-	926	1 023	89.0
Oman	466	84	-	3 226	-	290	15 507	786	20 359	21 246	95.8
Qatar	-	171	-	136	-	113	680	-	1 100	1 100	100.0
Saudi Arabia	52 058	40 414	8 123	44 296	-	6 002	52 058	1 384	203 346	214 969	94.6
Syrian Arab Republic	-	-	4 501	1 171	532	-	4 518	6 276	16 998	18 411	92.3
United Arab Emirates	984	1 868	-	322	-	1 089	1 295	-	5 558	8 360	66.5
Yemen Arab Republic[a/]	2 731	902	654	11 427	-	-	3 380	-	19 094	19 500	97.9
Democratic Yemen[a/]	2 746	1 438	369	3 011	-	-	15 469	4 885	27 916	33 297	83.8

Source: ESCWA, "The Role of ESCWA in Agricultural Resource Management and Conservation and in Combating Desertification in the Region" (unpublished mimeo), 1993.

Note: Assessment based on the Soil Map of the World.

[a/] The Yemen Arab Republic and the People's Democratic Republic of Yemen merged to form a single State on 22 May 1990.

adverse impact on the potential for crop production.[32] In the Syrian Arab Republic salinization and waterlogging affect 12 per cent of the Mediterranean watershed.[33]

53. In summary, land and water policies, together with economic and financial policies, in the past have contributed to a rate of depletion of land and water resources in many countries of the Arab region; such policies are not sustainable in the long run. Although it was difficult to predict the long-run environmental impact of policy measures, the concept of natural resource valuation was not incorporated into conventional economic analysis since natural resources were perceived to be abundant and free. For example, land reforms for improving the distribution of land resources failed to anticipate the adverse impact of fragmentation, over-exploitation and soil degradation at the time of their inception. Irrigation projects focused on expanding irrigated area without being accountable for the associated rise in waterlogging and salinity. Subsidizing of water led to depletion of scarce water resources, imposing higher water-use costs on the next generation.

II. LAND AND WATER RESOURCES - CURRENT ISSUES AND POLICIES

54. In recent years, the focus of land and water policies in the Arab region has been increasingly on improving (a) the efficiency of use, (b) conservation and (c) management of land and water resources.

A. Supply-management issues

1. Land reclamation and soil conservation

55. Loss of arable land through soil degradation is a serious economic and ecological issue in the Arab region. In view of food deficits in many of the countries, reclamation of land, especially through soil conservation, has assumed new importance today. Coupled with scarcity of water, a conjunctive approach to land and water policies is required to minimize losses in arable land owing to soil erosion, desertification, waterlogging and salinity.

56. An integrated approach to land reclamation and soil conservation requires a strategy using economic incentives for land use patterns and technological improvements, especially drainage, which would enhance the productivity and efficiency of land use to derive maximum returns without compromising future resource use. Such an integrated approach has been followed in Morocco since the late 1970s on about 75,000 ha of land.[34]

32/ The World Bank and the European Investment Bank, The Environment Program for the Mediterranean, 1990, p. 31.

33/ Ibid.

34/ FAO, "Soil and Water Conservation on Sloping Land–Present Situation and Prospects for Improvement: A Case Study on Morocco", a paper presented to the Near East Regional Commission on Land and Water Use, eleventh session, Tunis, 7-11 September 1992, p. 9.

57. As an illustration, the chart on page 21 indicates the ultimate loss in agricultural production associated with an irrigation policy which does not take into account the associated long-term requirements of proper drainage. As the water supply increases, the cropping intensity increases but at a decreasing rate as farmers use more water per unit area (figure a). Overuse of water eventually raises the water table owing to lack of proper drainage (figure b). As the water table rises beyond the critical level, waterlogging reduces the crop yields (figure c). Finally, inadequate drainage and the consequent waterlogging begin to affect production, which falls below the level that could have been achieved with better management practices and design (figure d).

2. Water resource development

(a) Desalinization

58. Many of the Arab countries, especially in the Gulf, have augmented supplies through desalinization of water. Middle East and North African countries account for 60 per cent of world desalinization capacity, of which half is in Saudi Arabia alone where inexpensive sources of energy are available.[35/] Sometimes desalinized brackish water is blended with freshwater for domestic use. Desalinized water resources augment the renewable water sources in Saudi Arabia up to 3.6 times, providing additional supplies of 52 MCM per capita per year (table 4).

59. Desalinization remains an expensive way to augment water, especially for energy-deficit and low-income countries. However, given the water scarcity in the region in general, and the increasing degradation of renewable water sources in particular, the option is being exercised as one way to augment scarce water resources.

(b) Urban wastewater treatment

60. Reuse of treated urban wastewater is already a practice in many of the water deficit countries in the Arab region. The supply of freshwater is being augmented by urban water after treatment in, inter alia, Kuwait, Saudi Arabia, Tunisia and Yemen. In the Syrian Arab Republic, the availability of treated water from four municipalities is planned at 1,035,000 m^3/day.[36/]

61. Although treated wastewater is expected to augment water supplies only modestly in most of the countries of the region, in water scarce countries of the Gulf the contribution is substantial, especially since the cost of producing a unit of treated wastewater is estimated to be only 8-18 per cent of that of desalinized sea water and 24-40 per cent of

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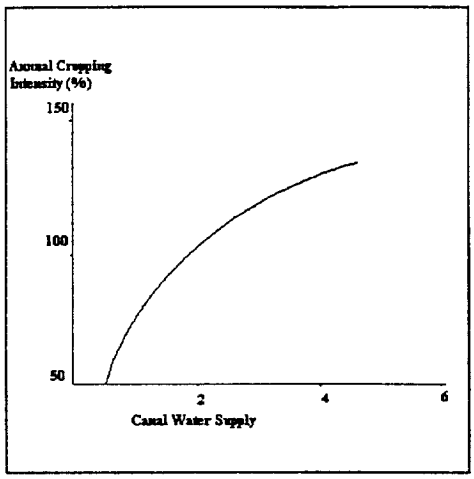
35/ The World Bank, A Strategy for Managing Water in the Middle East and North Africa, Washington, D.C., 1993, p. 20.

36/ FAO/UNDP, Syrian Arab Republic, Irrigation Sub-sector Review, Mission Report, February 1993, p. 9.

Chart. Sustainable groundwater development

SUSTAINABLE GROUNDWATER DEVELOPMENT

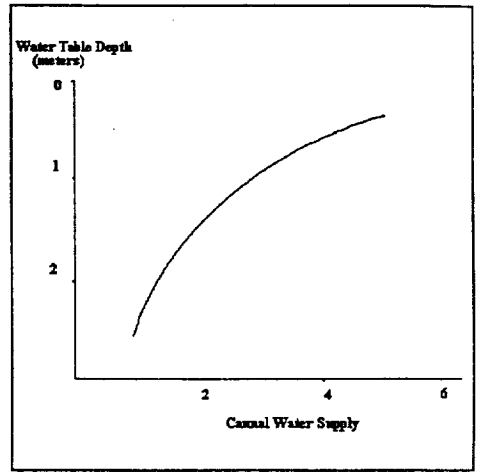
Figure a



WITHOUT DRAINAGE

MORE WATER
HIGHER WATERTABLE

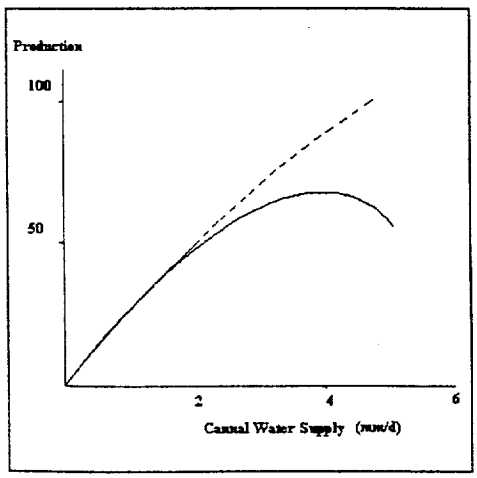
Figure b



MORE WATER
MORE CROPPED AREA

HIGH WATER TABLE
LESS YIELD

Figure d



WITHOUT DRAINAGE

MORE WATER
LOWER PRODUCTION

Figure c

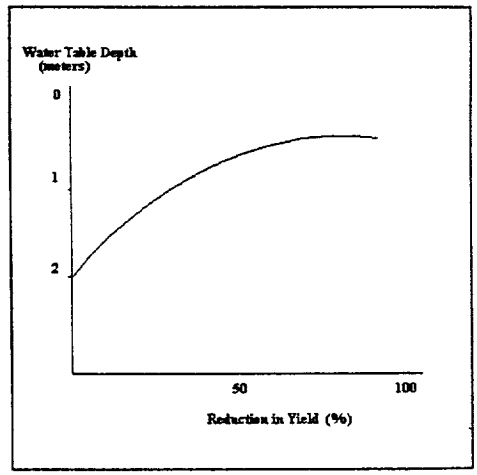


Table 4. Desalinated water resources in the Gulf countries, 1992

Country	Desalinated water/year (MCM)	Desalinated water per capita/year (CM)[a]
Bahrain	34	68
Kuwait	165	79
Oman	67	42
Qatar	65	163
Saudi Arabia	795	52
United Arab Emirates	163	102

Source: Munthir Haddadin, "Water and Land Issues in the Near East", a paper prepared for ESCWA (mimeo), April 1994.

[a] ESCWA calculations.

desalinized brackish water.[37/]

62. Important considerations in the treatment are the health and environmental considerations, which may be incorporated into planning for large investments.

(c) Reallocation of supplies

63. Since irrigation accounts for about 80 per cent of the total water use in the Arab region, even a small diversion to other uses, industrial or domestic, could release substantial amounts of water as a percentage of the requirements of these sectors. In Jordan, a 5 per cent transfer from the agricultural sector could increase domestic supplies by 15 per cent, despite the fact that non-agricultural use in Jordan, at 30 per cent, is already high.[38/] In Morocco, a 5 per cent diversion would result in a doubling of the supplies to the domestic sector.[39/]

64. This is an option currently, at least, being debated even though many countries, owing to the importance of the agricultural sector, are not in favour of diversions from it. Given the current inefficiency of water use in the agricultural sector, mainly owing to low water charges, the economics of water diversions may not be dismissed. The issue takes on an added dimension in view of the rapidly growing population and urbanization in the Arab countries.

(d) Regional cooperation towards water sharing

65. A regional cooperation in water resources could be one of the most viable approaches to addressing water scarcity problems in the region. The sharing of surface water, groundwater and aquifers in many of the Arab countries has given rise to international disputes. Out of 286 international water treaties, none is between the Arab countries.

[37/] The World Bank, A Strategy for Managing Water in the Middle East and North Africa, Washington D.C., 1993, p. 20.

[38/] Ibid., p. 21.

[39/] Ibid.

66. In the ongoing peace process in the Middle East, renewed importance is being given to the subject of international treaties within the context of regional cooperation in area of water resources. Any plan to augment land and water resources must take into account the marginal costs and benefits associated with the proposal. The real cost of providing an additional unit of water is increasing because technological advances cannot keep pace with the decline in per capita availability per year. For some countries, such as Algeria, the Libyan Arab Jamahiriya, Morocco and Tunisia, the cost of new water will be high.[40/]

67. Health and environmental considerations for wastewater treatment, political issues in water sharing, or increasing costs of desalinization of water need to be viewed in terms of sustainability of resources and especially issues in inter-generational equity.

68. Despite the complexities stemming from the politics of land and water resources in the region, policies and planning must take into account the economic, social and the environmental aspects of the programme.

B. Demand-management issues

1. Increasing efficiency of land use

69. The demand-management side of increasing the efficiency of land use involves policies which have a direct bearing on its productivity. Increasing the cropped area (especially for high-value crops) and improving the yield and the efficiency of cropping patterns can be essential elements in a land policy. However, an important dimension to these short-term objectives may be to formulate a strategy which maximizes these short-term returns on land while minimizing the degradation of land.

70. Whereas rent controls have been removed (or relaxed) in many of the Arab countries in recent years, macro and sectoral policies which cause distortions may also be reviewed with a view to improving increased efficiency. Distortions between private (market) and social prices have been a significant cause of the inefficient use of land. Coupled with controls on cropping patterns, these distortions have caused net returns to the society to be lower than they would have been under conditions of free-market competition. In Egypt until 1991, the value added per unit of land (which has rent control) at private prices for cotton, sugar, berseem, tomatoes, oranges and potatoes was far greater than the contribution of wheat. However, distortions between private and social prices of land resulted in a sub-optimal use, especially for production of wheat. If the same valuation is undertaken at social prices, resources would have shifted to a cropping pattern which reflected a higher comparative advantage and higher returns to land (table 5).

71. In recent years many countries, such as Jordan, have sought to remove the implicit taxation of agricultural commodities by removing

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[40/] The World Bank and the European Investment Bank, The Environment Program for the Mediterranean, 1990, p. 28.

Table 5. Returns to land in Egypt

	Wheat	Cotton	Rice	Sugar	Maize	Sunflower	Berseem	Tomatoes	Oranges	Potatoes
Private	766	859.6	681	1996.8	556.1	670.3	878.1	2 204.3	1 300.9	978.4
Social	935.4	1 353	395	166.2	548.2	468.7	560.9	1 798.1	922.3	635.1

Source: Calculated from Arab Republic of Egypt: An Agricultural Strategy for the 1990s, The World Bank, Washington, D.C., 1993.

controls on producer prices and aligning their exchange rates. Prices are being aligned and subsidies removed in many of the Arab countries.

72. It is recommended that the Governments in the region continue policies aimed at the liberalization of the agricultural sector by abolishing state intervention in production, pricing and marketing, leaving such decisions to producers and market forces. This can be done within the framework of a comprehensive economic strategy aimed at broadening the role of the private sector through the optimal use of the already scarce land and water resources according to the principles of comparative advantage.

2. Increasing conservation and efficiency of water use

73. Whereas increasing the water supply is important, the most cost-effective way to increase availability of water is through conservation and efficient use. Both these measures will release resources which can be utilized elsewhere.

74. When a commodity is in abundance, its intrinsic value, and hence the extent of "utility" derived from it, drops. Consequently, its use precludes any attention to measures of conservation or maximization of efficiency.

75. Table 6 and figure III indicate that the overall efficiency of water use in Jordan, a high water-deficit country, is, at 53 per cent, the highest in the region and much higher than the average for the developing countries. A large part of this is due to the proliferation of high-technology, high-efficiency drip-irrigation systems in Jordan, especially in the Jordan Valley. This compares favourably with an overall efficiency of water use of 30 per cent for the Syrian Arab Republic and 20 per cent for Yemen.

76. Few countries in the region have, however, recognized the need to charge "adequately" for irrigation supplies. In Morocco the water law requires that all water consumption be subject to the payment of fees on a common basis even if, in practice, rates in irrigation continue to be well below those in urban areas and, as in most countries, irrigation continues to be subsidized.[41/] In Egypt and Yemen, surface water supplies for irrigation are provided free, with the water agencies

[41/] Munthir Haddadin, "Land and Water Issues in the Near East", a paper prepared for ESCWA (unpublished mimeo), April 1994.

Table 6. Efficiency of water use

Country	Network	On-farm	Overall	Description
Jordan	75	70	53	Open canal (sprinkler/drip)
Morocco	70	60	42	Open canal (surface)
West Bank	74	..	..	Ec=87 %, Ed=80-90% (artesian well)
Egypt	67	..	..	Ec=75%, Ed=89%
Syrian Arab Republic	60	50	30	Most schemes at 60-75%
Yemen	55	40	20	Large-scale spate irrigation
Developing countries	68	40	30	Average

Source: M. Xie, U. Kuffner and G. Le Moigne, Using Water Efficiently: Technological Options, World Bank Technical Paper No. 205, Washington, D.C., 1993, pp. 7-8.

Notes: Irrigation efficiency is the net amount of water added to the root zone divided by the amount of water taken from any source.

Ec = conveyance efficiency
Ed = distribution efficiency

financed from taxes and other public revenues.[42/]

77. Water charges in the region do not cover even the operation and maintenance costs of maintaining the irrigation system. In Algeria the existing water charges average 6.3 per cent of their marginal cost.[43/] In Egypt, the marginal cost of raw water plus distribution is $0.25/m³ in the urban areas, but the water charges for domestic consumers are not more than $0.03/m³; in Jordan irrigation costs charged by the Government are 50 per cent of the operation and maintenance costs.[44/] Low water charges through subsidization of water has sent the wrong signals to users and resulted in an inefficient use of water resources, especially in the agriculture sector.

78. Pricing of water, however, has been receiving increased attention in many of the countries in the region, among them Egypt, Jordan and the Syrian Arab Republic. Whereas many countries now accept, in principle, the need to increase water charges, the debatable issue is: by how much?

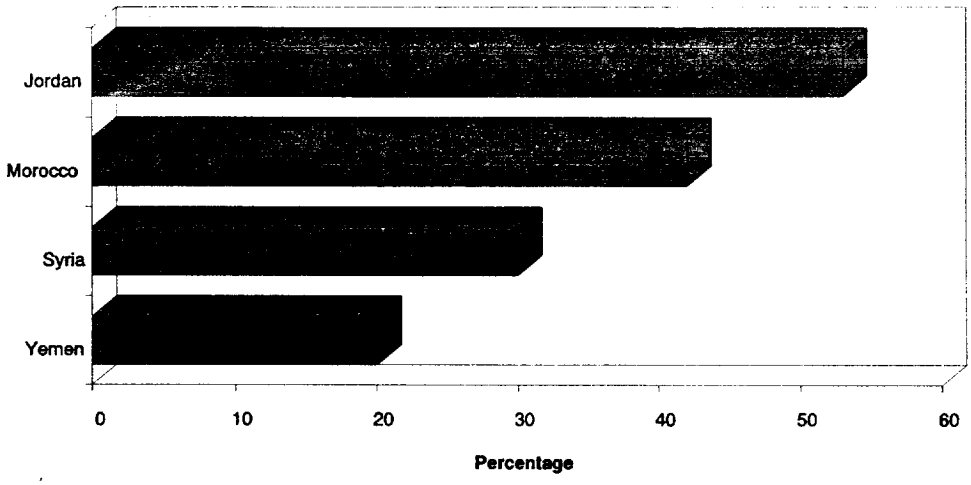
79. Several concepts are being studied in ascertaining water charges.

42/ Ibid.

43/ The World Bank, A Strategy for Managing Water in the Middle East and North Africa, 1993, p. 25.

44/ Ibid.

Figure III. Overall efficiency of water use in selected Arab countries



Under perfect market conditions, the economic price of water represents its marginal or opportunity cost. One approach is to price water to cover the operation and maintenance cost of supplying water to the user. Another would include a portion of the capital investment as well. A third approach is to price water at its opportunity cost or the cost in the next best use in the short run, assuming capacity is fixed. Another view, especially in the face of the rising cost of an additional unit of water, is to price it at its long-run marginal cost (LRMC) which, by definition, would include environmental damage or resource depletion costs in the long run.

80. The objective of the pricing policy could be one or a combination of the following:[45/]

(a) To allocate resources efficiently between sectors within the economy and within the sector itself;

(b) To satisfy considerations of equity or the ability to pay of consumers, especially the poor;

(c) To raise revenues to meet the financial requirements of providing the service;

(d) To subsidize special areas to encourage rapid development; and

(e) To make political considerations for a special area or

[45/] This section is based on Mohan Munasinghe, "Water Supply and Environmental Management: Developing World Applications", Studies in Water Policy and Management, Westview Press, 1992.

subsector of the population.

81. Some of the objectives conflict. For most countries, satisfying these multiple objectives would involve a trade-off.

82. Pricing water at its LRMC would include the O and M cost, capital cost and the cost of resource depletion and environmental damage. This would imply valuing water at its social efficiency price to the community and is different from pricing water under the assumption that the future costs of supplying the additional unit will not change. Under such a pricing mechanism, if demand is increasing (owing to changing patterns of consumption or increases in population, as is the case in many Arab countries), water supply costs will increase. In practice, it would imply a different structure of prices for different consumers, supply times (peak vs. non-peak time); quality of water supplied and geographical areas.

83. When prices are set according to the LRMC under conditions where the marginal cost of producing an additional unit of water is increasing, as in many of the Arab countries, a financial surplus may be generated. This could be diverted to subsidize special groups such as the poor or those in underdeveloped areas.

84. In the face of water scarcity in the Arab region, considerations of sustainable development dictate that pricing of water reflect as closely as possible its long-run marginal cost. As a first step, water charges may be levied (a) to recover O and M costs plus a portion of the investment costs; and (b) as a tool to promote efficient use of the resource.

C. Institutional and regulatory framework

85. An institutional and regulatory framework provides the basis for implementing the resource allocation policies. Whereas policies attempt to address the issue of what is to be done, institutional analysis asks who is to do it.[46/]

86. Land and water resource policy in the region is not embedded in an overall national natural resource conservation policy. Most of the resource conservation measures in the countries of the region have been implemented on a piecemeal basis, without a well-conceived development strategy taking into account the institutional and regulatory framework needed for support.

87. Public sector performance in the irrigation sector of many countries in the region has been, at best, poor on the basis of some of the standard criteria such as adequacy, dependability, equity and sustainability.

88. On a national basis, few, if any, of the countries of the region

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46/ Scott Guggenheim, "Institutional Arrangements for Water Resources Development", Country Experiences with Water Resources Management, World Bank Technical Paper No. 175, Washington, D.C., 1992, p. 21.

have institutions with overall responsibility for the development of natural resources such as land and water. Where more than one institution is responsible for specific policies and programmes in land and water management, inter-agency coordination is less than optimal. Often, different ministries or departments are responsible for crop production, soil conservation, range management and forestry. A frequent problem in the past has been the preoccupation with construction projects, with the prime objective of increasing agricultural production, with little emphasis on management-oriented efficiency increases.

89. Mismanagement of irrigation supplies occurs as bureaucracies frequently are ineffective in managing irrigation without the participation of farmers. Inequitable distribution of water is manifested in illegal water diversions and reduced water deliveries at the tail compared to the head.

90. Institutional reform is an integral component of any integrated investment strategy for water development and the sustainable growth of agriculture. There are a number of options ranging from institutional reforms involving managerial and organizational restructuring to creation of public utilities based on the concept of a complete turnover of irrigation delivery to private sector and farmers' associations.

91. Creation of water users' associations (WUAs) are often cited as one way to improve the welfare of the farmers and develop irrigation and drainage by providing an alternative to the monopoly of the public utilities. However, as yet the global success of WUAs is mixed: experiences in countries like Mexico, Argentina, Indonesia and the Philippines are considered a success, while the experience in Pakistan is based on pilot projects and its sustainability on a larger scale still debatable.

92. In the Arab region, Morocco and Tunisia have been among the first to involve farmers in water distribution. Whereas Egypt has recently started WUAs under a USAID technical assistance programme, it is too early to evaluate its adoption possibilities on a large scale. In Sudan, recent irrigation policies are geared more towards improving the irrigation turnover (Box 1).

93. The legal and regulatory framework governing resource management is generally weak. Most of the existing legislation was drafted in the past for sector-specific activities and not for an integrated environmental approach. With its focus on compliance rather than a problem-solving approach, especially in cases where there are socio-economic reasons for non-compliance, the legislation has often contributed to environmental degradation such as overgrazing of rangelands, encroachment of urbanization on suitable agricultural land and overpumping from groundwater.

94. In many countries of the region, over-exploitation of groundwater, low efficiency of water use and a rapid degradation of the natural resource base require formulation and strengthening of the institutional and regulatory framework. For instance, in Yemen, land tenure and water rights were singled out as constraints to efficient development and management of natural resources. Whereas the potential existed to increase the area under spate irrigation by 70 per cent, the complexity

Box 1. Privatization of irrigated agriculture in Sudan

Parastatals which for many years have provided farmers with agricultural inputs and marketing facilities in such large schemes as Gezira and Rahad, are shrinking rapidly as their roles are turned over to profit-making companies and cooperatives. Increasingly powerful farmer tenants' unions are demanding more control over cropping decisions. In the Sudan in 1992 the parastatals under the Agricultural Ministry turned over management of minor canals of the large schemes to the Ministry of Irrigation. Management for field canals was shifted to the farmers.

Similar trends are occurring for pump irrigation schemes along the White and Blue Nile. Farmers are eager for self management but unsure as to whether they will be able to avoid contracts with commercial companies or whether they will be able to manage effectively without some assistance in the short run. Farmers are often not experienced in obtaining financing for agricultural loans or marketing their crops. There have been virtually no efforts to organize them for management purposes (with the exception of a small pending IFAD-funded project in the northern Nile area). Farmers in pump schemes will be able to decide by majority vote whether they will manage their schemes directly or enter into contracts with private companies.

Privatization is coming fast to the farmers of Sudan without the benefit of phased institutional or infrastructural development and training. The outcome of these rapid changes is unclear, particularly for social equity and local control over resources. However, experience elsewhere suggests that development of viable local institutions is a prerequisite to sustainable irrigated agriculture.

Source: D. Vermillion/M. Shafique, IIMI (International Irrigation Management Institute) Review, November 1992.

of land tenure and water rights issues delayed expansion of irrigation of 35,000 ha for 20 years.[47/]

95. In contrast to surface water rights, the groundwater rights are often ambiguous and difficult to enforce. Access to water is tied to land in the riparian sense, but the amount of extraction and the location of use is not a function of land. Once the farmer has access to an aquifer, he can physically mine as much water as he desires. "Open access" often leads to a long-term decline in the water table. This is a classic case of an externality arising from the use of the "common property resource".

96. The existing legal groundwater rights are out of date and unable to

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47/ The World Bank, Renewable Resource Management in Agriculture, Washington, D.C. 1989.

meet today's challenges stemming from newer concepts, such as the sustainable development of resource use. In addition to the intra-generational issues, inter-generational issues (equity) in resource management have gained importance in recent years. Empirical evidence shows that irrigation technology has increased agricultural productivity and employment, but the benefits have gone more disproportionately and more rapidly to the rich than to the poor. Equity considerations require detailed study of the effect of irrigation development on the rural poor to identify feasible policies and institutional approaches that will improve the access of poor to these resources.

97. Insecure property rights over land and water have been a determinant of the farmers' lack of access to capital markets and have often led to low investment in land and water development such as soil conservation, improvement of pastures and owning a private well. In turn, this has often resulted in low productivity, low farm income and encroachment on marginal lands to augment farm income.

98. Whereas the necessary cadastral surveys, title registration and other related expenses cost only 2-3 per cent of the pre-title value, the issuance of secure land titles to farmers could easily result in a doubling or tripling of the value of the land. Estimates of productivity gains from land titling range from 10 to 30 per cent, while those from investment in land improvement and soil conservation and tree planation range between 60 and 200 per cent.[48/]

99. In summation, natural resource management policies could include (a) a clear recognition of the link between the scarcity of resource and its price (this link can be improved by employing economic principles of valuation to the resource); and (b) a regulatory framework which is clear and enhances the potential for creating flexible institutions for water management in the region, including those for trade in water within the confines of a policy environment conducive to sustainable development in the long run.

100. A few of the policy measures are suggested below and highlighted in Box 2:

(a) Reduction and eventual elimination of economic policies that distort well functioning markets, such as taxes, subsidies, quotas, public investment. A good policy case is the elimination or reduction in acreage allocation for certain crops in Jordan and Egypt;

(b) Improvement and mitigation of market failures such as insecure and absent property rights, unpriced resources, externalities through intervention that improve the functioning of the market. Examples from the region include: the introduction of water pricing in Sudan (almost full cost recovery); water pricing in the Jordan Valley through water meters (possibility of charging a marginal price for water);

(c) Incorporation and internalization of environmental and social effects of sectoral and macro policies and investment projects. Morocco

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[48/] T. Panayotou, Economic Instruments for Natural Resource Management in Developing Countries, Harvard Institute for International Development, 1993.

Box 2. Depletion of natural resources: impact, causes and possible solutions

Kind of degradation	Impact	Causes	Possible solutions
Depletion of freshwater resources	Depletion of groundwater; increasing marginal cost	Pricing and regulation; perception of water as free good	Improved pricing; integrated watershed management; improved technologies
Degradation of quality of freshwater	Poor quality surface- and groundwater; health impacts; costs of water treatment; saline intrusion; increased marginal cost of potable supply	Industrial and urban pollution; pollution of groundwater; overpumping of groundwater	Revised pricing; regulation of groundwater extraction; integrated watershed management
Land degradation	Poor drainage; erosion and siltation; desertification; loss of fertility	Deforestation; overgrazing; agricultural practices; pricing distortions affecting agricultural inputs and outputs; land tenure systems; enforcement of regulations	Sustained approach to management of natural resources; improved markets
Degradation of ecosystems	Damage to wetlands (rich genetic diversity, hydrologic aspects), plants, birds (breeding grounds for migrating birds), and shellfish	Water pollution; low market price for land in relation to true value; lack of controls on development; agricultural practices; solid waste disposal	Integrated development planning and regulation; activities of nongovernmental organizations

Source: The World Bank and the European Investment Bank, The Environmental Program for the Mediterranean, Washington D.C., 1990.

and Tunisia have included environmental provisions in their structural adjustment programmes.[49/]

[49/] Ibid.

III. CONCLUSIONS AND RECOMMENDATIONS

101. Scarcity of land and water resources indicates that horizontal expansion of agricultural production is a limited option in the Arab region. The objectives of food security will need to be based on increases in agricultural production stemming from improvements in yields, cropping mix and intensities. An important component of this development strategy will be optimization of the land and water resource use.

102. For development to be sustainable, the countries of the Arab region could manage their land and water resources to maximize returns in the short run while protecting the natural resource base from further degradation. An integrated approach encompassing the economic, social and environmental policies, which are mutually reinforcing, will need to be pursued within the ambit of sustainable development.

103. The following recommendations are presented:

(a) It is recommended that policies pursuing the liberalization of the agricultural sector be continued by abolishing direct state intervention in production, pricing and marketing, leaving such decisions to producers and other market forces. Within the framework of a comprehensive economic strategy, policies are needed to broaden the role of the private sector through the optimal use of the already scarce land and water resources, making full use of the comparative advantage;

(b) In view of the limits on enhancing the supply of cultivable land and water, the emphasis could be on demand management, which, among other things, includes pricing the resource, increasing on-farm and system efficiency of water use, and developing water markets where possible;

(c) Agriculture will continue to be the prime user of water in the region. Farmers pay a low price for water use in most countries of the region. As land and water are increasingly scarce resources, a rational price policy would improve efficiency in resource allocation, alleviate budget deficits and reduce environmental costs. Such a policy would not only reduce problems of waterlogging, salinity and salinization but would also reduce the water shortage through demand management and alleviate the problem of environmental degradation. As a first step, water charges may be levied to recover the O and M costs of the irrigation infrastructure only since in the short run equating marginal return of water to its price is not feasible in view of the underdeveloped water markets and economy-wide price distortions;

(d) In the long run it is important to ensure financial viability of the institution providing services. Under such a scenario, prices must be based on either LRMC or on acceptable returns on investments as a fraction of net assets and the working capital. In the long run this would be the rational choice;

(e) Any increase in water charges (either in the short or long run) can be linked to the agriculture pricing policy of the country. Historically, farmers have faced direct and indirect taxes on some of the

strategic crops in Egypt, Morocco, Sudan and Tunisia. Removal of distortions in input prices may also accompany output prices;

(f) To achieve sustainable development, social costs and benefits to the society as a whole must be ascertained, keeping in view the inter- and intra-generational aspects of policies and programmes. Costs must be assessed with a long-term sustainable development approach to land and water resources; policies must be formulated which aim at generating net returns in the present while preserving the stock of natural resources for the future;

(g) The environmental impact of land and water use on the quantity, quality and availability of the resource must be assessed not only in the short but in the long run. Environmental protection of a country's land and water resources requires the establishment of water quality standards. Agricultural productivity is closely monitored to keep a minimum safe quality of water. At the same time, provision of drainage is one of the key investment areas for developing sustainable agriculture in the future;

(h) The irrigation performance in the region has been, at best, poor, based on some standard criteria such as adequacy, dependability, equity and sustainability as discussed above. Institutional reform seems a precondition for any future strategy of supply and demand management that will contribute to the sustainable growth of agriculture. The options range from a government model to semi-autonomous public utilities to complete privatization of the water delivery system;

(i) In the ongoing peace process in the Middle East, renewed importance is being given to the subject of international treaties within the context of regional cooperation and water sharing. Any plans to augment land and water resources must consider the marginal costs and benefits associated with the proposal;

(j) Water legislation is complex and outdated. As water issues are at the forefront of policy debate, coherent legislation will become increasingly necessary if the cost of ad hoc approaches to water allocation and control are to be avoided. Enforcement of rights and regulations would be critical to efficient management of land and water resources in the region.

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