

APPENDIX 2: OVERVIEW - WATER POLICY REFORM IN THE NEAR EAST REGION: POLICY ISSUES AND LESSONS LEARNT

Dyaa Abdou	<i>and</i>	Mahmood Ahmad
<i>Chief, Policy Assistance Branch, RNEP</i>		<i>Policy Officer, RNEP</i>
<i>FAO Regional Office for the Near East Region, Cairo</i>		
<i>Disclaimer: The positions and opinions presented are those of the authors and do not necessarily represent the views of the Food and Agriculture Organization of the United Nations.</i>		

1. INTRODUCTION

Current developments indicate that considerable progress has been made in recent years in increasing the efficient use of water resources at farm and basin levels. Under reform programmes, the focus of water resources development is shifting from supply-side to demand-management policies. On the supply side, programmes are continuing, such as land development and soil conservation (through re-allocation, water harvesting, supplementary irrigation and desalinization) and on the demand side the issues of allocative and productive efficiency, cost recovery, water markets and the extent of possible privatization have been part of ongoing policy debate to reform the water sector.

Experience so far indicates a strong link between macro-economic and agricultural policy reforms and sectoral reform required in the water sector. The agricultural sector is generally the leading sector for reform programmes in many countries of the Near East Region, however, and issues of policy reform in the water sector (i.e., irrigation) are usually taken at a late stage in any economic reform programme. Key reforms in the water sector have to take into account that agriculture will continue to be a prime user of water in the region. As land and water are increasingly scarce resources, a rational policy seems to be needed in that regard. 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. For development to be sustainable, the countries of the Near East Region will have to manage their land and water resources to maximize the returns in the short term while protecting the natural resource base from further degradation. An integrated approach encompassing economic, social and environmental policies which are mutually reinforcing will need to be pursued within the ambit of sustainable development.

In this paper, a review of major macro-economic and sectoral policy issues relative to water policy reform will be attempted, followed by a discussion of the major issues at the farm and household levels, and the conclusions and lessons learnt, based on FAO experience in providing economic policy advice to the countries of the region.

2. MACRO-ECONOMIC AND SECTORAL POLICY ISSUES

2.1. MACRO-ECONOMIC POLICY REFORM AND WATER

For many years, the economic systems in a number of Near East countries discriminated against agriculture through policies such as high levels of protection for domestic manufacturing sectors, overvalued exchange rates and taxes on agricultural exports. Egypt, Pakistan, Sudan and Turkey are cases in point, where resources were transferred out of agriculture through implicit and explicit taxation. Most these countries today are at some stage of structural reform, attempting to adjust and transform their economies towards a more liberal economic trade regime, modifying government involvement and increasing market influence.

The countries of the region have also invested heavily in the past in developing water resources infrastructure. The government investment expenditures (fiscal policy) on irrigation, flood control or dams in countries like Egypt, Pakistan, Sudan, Syria and Turkey have been huge compared to allocation to other sectors. For example, in Syria, to support the objectives of achieving food self-sufficiency and to reduce dependency on imports, the government has expanded agricultural exports to earn more foreign exchange and in the process has invested 60 to 70% of the entire agricultural budget in irrigation over the past ten years. In many cases the dividends have not matched the level of investment. As a result, some macro- and sectoral issues have come to the forefront of policy debate, ranging from questions of virtual water, to high costs of operation and maintenance (O&M) expenditures, to privatization of water delivery. Macro- and sectoral policies often have profound impacts on realization of benefits from such an investment, maintaining the infrastructure and planning future investment in the sector. It is evident from past experience that a country's overall development strategy and use of macro-economic policies - including fiscal, monetary and trade policies - directly and indirectly affects demand and investment in water-related activities.

Recently, the national economies in the Near East Region, becoming predominantly open, were and still are affected by external shocks. Most important of these shocks have been the Uruguay Round Agreement; the expanding European Union and the resurgence of interest in regional economic cooperation; and the sudden shift to market-oriented economies in the Central and Eastern European countries. Countries are attempting to adopt suitable policies to harmonize reform at both the macro-economic and agricultural sector levels. The measures adopted, including water policy reform in the region, aim primarily at maximizing gains and minimizing short-term losses in their endeavours to integrate their economies into the new international economic order.

The recent record in consolidating macro-economic stability with solid economic growth is very mixed in the region. Egypt, Morocco and Tunisia have successfully adopted a stabilization programme. Where success is evident, most of the economic transformation has taken place at the macro-level and much remains to be done to effect the consequent adjustments at the micro-level, i.e., reform in the water sector towards changes in institutional and incentive structures, or at the level of water users. It is also noted that countries with successful stabilization and structural reform policies have been able to address sectoral issues more effectively. Egypt was able to reform the agriculture sector effectively after achieving a reasonable stabilization and structural adjustment programme (SAP) and is ready to address policy issues in the water sector. In contrast, the stabilization programme is still a challenge in Pakistan, and some key policy reforms needed in agriculture and water sectors have been postponed.

Water policy reforms in general, and price reforms in particular, are proceeding at a slow rate in some countries of the Near East Region. Improving water resource management requires recognizing how the overall water sector is linked to the national economy. Equally important is the assessment of how alternative economic policy instruments influence water use across different economic sectors, as well as among local, regional and national levels and among households, farms and firms. For too long, many water managers have failed to recognize the connection between macro-economic policies and their impact on, for example, technical areas such as irrigation.

2.2. INSTITUTIONAL REFORM AND PRIVATIZATION

In the Near East Region, there is an increasing awareness and concern about the need for institutional reform. Thus Egypt, Iraq, Jordan, Morocco, the Palestinian Territories, the Sudan, Tunisia and Yemen have already undergone, or are currently undergoing, serious institutional reform in the agriculture sector. Jordan is actively involved in preparing its *National Water Policy, Strategy and Action Plan* as a major policy document linked with the proposed institutional restructuring that will enable Jordan to deal with water issues in an integrated manner. Palestinian Territories and Yemen are considering an independent water authority to deal with water issues. Sudan has created an independent authority to deal with water

problems, including water pricing and other regulatory reforms. Syria and Iraq are trying to work out a concrete strategy to deal with regional water issues, despite political differences in other spheres.

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 viable options, ranging from institutional reforms involving managerial and organizational restructuring, to decentralization of responsibilities, and to creation of public utilities based on the concept of a complete transfer of irrigation delivery to the private sector and farmers' associations. There seems to be greater awareness of the value of farmers' participation in the design and implementation of water distribution at the farm level in the Near East.

One option considered by a number of countries in the region is that of creation of water users' associations (WUA) to increase the welfare of farmers and develop irrigation and drainage by providing an alternative to the monopoly of public utilities. In the Near East Region, Morocco and Tunisia have been among the first to include farmers' participation in water distribution. Egypt has recently started WUAs under a USAID technical assistance programme.

Sudan provides a good example of potential benefits that might result from transferring management responsibilities to users. The government has recently adopted a market approach to providing water supply to the farmers. The idea is to reduce subsidies and transfer responsibility to the private sector. In 1995, the Government of the Sudan created the Irrigation Water Corporation (IWC), an institution independent of the Ministry of Finance. It is expected that IWC will be able to generate enough revenues to be financially independent, while providing better services in maintaining the irrigation infrastructure. The user groups collect water charges and maintain the irrigation infrastructure. It is pointed out here that farmers' willingness to pay will depend on the quality and timeliness of service from IWC. Pakistan and Tunisia are envisaging similar changes.

Pakistan provides another interesting case, where policy debate centres on a number of options cited for institutional reforms in water sector. The donors are increasingly proposing a greater role for WUAs, to the extent of complete privatization of water delivery to farmers, while the proposal from the government often entails a milder view of changes to the existing 'fiscal model' and focuses more on investment priorities in the coming years. The World Bank is suggesting that the best option for the Government of Pakistan is to develop an autonomous, commercially oriented public utility on a canal-command basis, that would be financially independent and would have commercial interests. At farm level (*mogha* level), fully functioning farmer organizations are proposed, envisaging for them a continuous role in supervising O&M and collecting user charges. The federal agency (WAPDA) would continue to be responsible for overall assessment, coordination and development of water resources.

Apart from restructuring of the institutional set-up, many countries of the region require formulation and strengthening of their regulatory frameworks, including clarification of property rights. The legislation governing the development and use of groundwater need to be improved in most countries of the region. The institutions responsible for enforcing compliance need to be strengthened to address the grave situation. The farmers are drilling wells despite legislative restrictions. Reversing water degradation and depletion requires actions aimed at the principal factors that perpetuate these problems.

In many countries of the Near East Region, the legal and regulatory framework governing resource management is generally weak. Most of the existing relevant legislation was drafted in the past for sector-specific activities and not for an integrated environmental approach. With its focus on compliance rather than on a problem-solving approach, especially in cases where there are socio-economic reasons for non-compliance, the legislation has been a contributory factor in environmental degradation, such as overpumping from groundwater.

2.3. TRADE POLICIES

There is a significant relationship between the issues of trade reforms under the Agreement on Agriculture and the Uruguay Round, the food security issues and availability and rational use of water. The main feature of the Agreement on Agriculture and the Uruguay Round are that countries are required to gradually produce, market and trade commodities according to their comparative advantage or produce commodities with greater economic efficiency. This also means valuing input and output resources at their opportunity cost, or removing market and policy failure. Governments are finding it increasingly difficult to remove the distortion in the water sector, especially for irrigation. If water is valued at its opportunity cost, most farmers find it uneconomical to produce some strategic crops, particularly grains such as wheat, barley and maize. Unless countries are able to export other commodities to earn foreign exchange, it is very difficult for governments to forego some of their food security objectives, even if it might incur costs that may not be sustainable in the long run.

To reduce deficits in trade in agricultural commodities, or even to keep it at bay, agricultural production has to increase at least in parity with population increase. This can be achieved through horizontal expansion in agricultural areas, and through incremental yields per unit land area. Horizontal expansion is possible only through irrigated agriculture, since rainfed areas have been stretched to almost the maximum possible by successive generations throughout history. Expansion in irrigated area requires more water for irrigation.

Major exporters and industrial countries claim that the global trade in food staples has been particularly accessible for the past fifty years, even to poor economies, because the generators of the global grain surplus, the USA and the European Union, competed down the global price of grain until the beginning of 1995. Before then, grain importers enjoyed heavily subsidised 'virtual water.' During the 1980s, grain was being traded at about \$US 100/t, despite costing about \$US 200/t to produce. International prices for cereals started to rise rapidly in 1995, and by the spring of 1996 wheat was being traded at \$US 250/t. It is argued that there seems no likelihood that, under the World Trade Organization (WTO) regime, they will ever return to their 1980s' levels.

Unstable cereal prices in general - and the wheat market in particular - emphasize the strategic importance of virtual water. Countries can have access to virtual water by developing export-led economies specializing in producing and exporting commodities with comparative advantage, thus generating enough foreign exchange to provide the purchasing power to trade in international markets. It is often argued that countries of the Near East are, and will remain for the foreseeable future, the major grain importing group.

In short the argument is that the water embedded in traded food commodities - i.e., the virtual water - is particularly important for water-scarce countries in the arid regions. The countries of the Near East which are mostly food-importing countries are interested in the amount of water that is saved by importing food, and the amount of water it is selling with its exports, but this is independent of the amount of irrigation water that was needed to produce the food commodity. This can best be evaluated through an input-output model for different sectors and subsectors to establish the extent of virtual water. This will enable the conversion of international food trade statistics into equivalent water flow in virtual river basins. It could also clarify the feasibility of sorting out the virtual water parameter, in statistics and otherwise. These are some of the policy questions that need further work in coming years, especially for the Near East Region. Actually, the concept of virtual water still needs more clarification and verification, and is being challenged on conceptual and methodological grounds. Inasmuch as virtual water is the less costly option, it has little bearing on present reality.

The issue of trade and water can also be viewed from a different perspective. The Near East Region has been at the forefront of achieving food security through achieving a high degree of self-sufficiency in growing wheat and other cereals. In some countries of the region, the private profitability of wheat was generally made attractive through price incentives, e.g., Iraq, Saudi Arabia and Syria. If one calculates the social profitability (economic profitability) of growing irrigated wheat, the majority of countries of the region carry no comparative advantage. This implies that to produce one dollar's worth of wheat, investment of more than one dollar's worth of domestic resources is needed. This is a losing proposition for society.

Clearly, in such cases, economic rationale dictates reliance on external supplies. This has been confirmed by some recent work in Iraq, Jordan, Palestinian Territories, Syria and Yemen.

3. MICRO-LEVEL ISSUES

3.1. FOOD SECURITY POLICIES

The food security situation is generally evaluated in terms of food availability, stability and accessibility. Availability of water plays a key role in achieving a higher degree of food production and its sustainability. The situation varies from country to country and region to region. However, in the long term, achieving food security would mean enhancing the production base of those crops that can be produced more efficiently and contribute to the preservation of the natural resource base, especially land and water.

In most water-short countries of the Near East Region, about 60 to 80% of the water is consumed by the agriculture sector, with lowest value-added per cubic metre of water. As water scarcity increases, there will be growing pressure on agriculture to release some of the water for higher-value use, where willingness to pay is much higher. It means that, to achieve higher levels of food security, countries in the region would need to produce more food with less water. Future food security problems seem to be closely linked to improved productive and allocative efficiency of water use, which means greater emphasis on demand management. Demand-management policy reform in the water sector is the key to more efficient performance of the agriculture sector in the region and closely related to the issue of greater food security.

A substantial proportion of the population of the Near East lives in rural areas and depends on agriculture for its source of livelihood. Increasing agricultural production, therefore, remains important not only for increasing food security but also for poverty alleviation. Within this context, the lack of availability of adequate supplies of water in the region is a major limiting factor for the growth of agriculture, and consequently has implications for food security. Over half of the region's agricultural production is realized from irrigated agriculture. Water development for food production thus constitutes an important element in increasing food security. Stability in food supplies in the next century will stem from improved water management, which in turn requires funds; qualified, capable farmers and managers; and strong administrations.

For any country in the Near East Region, food self-reliance requires an economy that generates enough exports to cover the cost of food imports in order to meet the food needs of the population. It also requires that in some places in the world sufficient soil moisture, stemming from rainfall and irrigation, is available to grow enough food for all of the population in the world. In the context of food self-reliance, 'water security' is obtained through a policy of social and economic development and rational, sustainable use of limited water resources, with the aim of meeting requirements for domestic and urban use, as well as of commerce, tourism and industry, so as to have the ability to supply employment for the population.

In a number of Near East countries, public works programmes are in place to improve household food security and employment generation in the water sector. For instance, in Yemen, to help the poor, to combat unemployment and enhance food security, it is proposed to re-allocate a part of the wheat and flour subsidy to large-scale, labour-intensive, works in the areas of rehabilitating old and creating new terraces; correcting torrents and wadis; improving watershed management, through small dams, reforestation and range improvements; improving drinking water supply in the rural areas; and enhancing solid waste collection. In order to minimize the negative impact of liberalization programmes, especially elimination or reduction of wheat and flour subsidies to the poor, Egypt, Jordan and Pakistan are also undertaking programmes such as land levelling, canal lining, watercourse cleaning, and other water harvesting and public works programmes that can improve household food security through income generation on the one hand, while providing productive employment on the other.

In Egypt, a *Public Works Programme*, funded under the social fund project, has been completed, which aimed to transfer income to the poor while developing local infrastructure by creating employment through use of labour-intensive but efficient public works. The water sector programme in its first phase completed 18 km of wastewater network, 34 km of canal development, 175 km of canal protection and 600 km of canal maintenance. Further, it constructed two wastewater treatment and pumping stations and a vast network providing potable water for rural communities. The main problem faced during phase one was O&M of SFD-financed infrastructure. In its new phase, SFD plans to develop a new approach so as to involve local communities in O&M of the infrastructure.

In the context of food security, sustainability of agricultural production is also very important. The natural resource base, in which water is probably the key element, needs to be preserved not only for this generation but also for future generations to come. The drive by a number of countries to attain self-sufficiency has produced a second generation of water-related problems. In countries such as Jordan, Libya, Oman, Saudi Arabia, Syria and Yemen, groundwater is being mined at unsustainable levels due to the ever increasing number of private wells, resulting in rapid lowering of water tables and increasing the cost of pumping the water. Recently, the countries of the region have started to devote more balanced attention to achieving higher levels of self-sufficiency in agricultural production and to sustainable use of water. However, the previously adopted policies have generated external costs unpaid by the consumers and producers of the commodities. Some examples from the region are presented below.

In Yemen, water resources are being mined at very high rate, as the annual recharge stands at $600 \times 10^6 \text{ m}^3$, compared to $1\,300 \times 10^6 \text{ m}^3$ abstracted, indicating $700 \times 10^6 \text{ m}^3/\text{year}$ of overpumping. The aquifers in almost all basins are depleting at a rate approaching 6 m/year. If this continues, the Sana'a basin aquifers will run dry by 2008. Past economic policies are partly to blame for this water depletion. The low prices of major items such as diesel, wheat, flour, water for agricultural and non-agricultural use led to excessive use of groundwater, overburdening the budget, depriving the country of export opportunities and foreign exchange earning or saving, and caused environmental damage. Agriculture is marked by development of a kat-based economy, diverting the bulk of scarce water resources towards its production and growth.

In Saudi Arabia, 90% of water is pumped from the underground reservoir, which has negligible water recharge and is expected not to last beyond the beginning of the next century. Irrigation water quantities already pumped are in excess of the safe yields of aquifer; no less than $14\,000 \times 10^6 \text{ m}^3$ ($909 \text{ m}^3/\text{caput}$) of fossil water is used for irrigation annually. A huge subsidy on production of a number of crops, with great emphasis on wheat, provided incentives to mine groundwater. In 1992, the Government had to provide \$US 2 000 million in subsidies for the domestic production of 4 million tons of wheat, offering farmers a support price five times the international price. The Government is beginning to realize the environmental cost of degradation implicit in achieving self-sufficiency, and is gradually moving away from subsidies for agricultural production.

In Syria, the Government's past policies to promote food self-sufficiency resulted in groundwater depletion in many regions. Overpumping in Aleppo has resulted in the water table falling by 1 m/year, and in Salamia, near Hama, the area has dried to the extent that it has become rainfed. The subsidies to industrial crops, major cereals and feedgrains were attractive enough to encourage mining of groundwater beyond sustainable levels. For example, the 1992 domestic wheat price was almost twice the international price. These policies have contributed to the expansion of tube-wells, which supplied 80% of the land newly irrigated since 1987. With irrigation, farmers obtain higher yields, more stable production and greater profit. Since water is free, the only investment expense required is the cost of installing a well, which is purchased with subsidized credit. In addition, fuel was subsidized and used for operating imported pumps purchased with overvalued currency (an implicit subsidy). At the same time, recent changes in trade and exchange rates policies made agricultural products more competitive in the regional markets. Farmers who initially planned only supplementary irrigation for winter wheat are finding summer vegetables and

irrigated fruit production increasingly profitable. These policies have had a direct bearing on groundwater depletion and resource degradation. The Government of Syria started recently to correct these distortions.

3.2. PRODUCTIVE AND ALLOCATIVE EFFICIENCY

Experience from the region indicates that the water policy priority should be to improve productive efficiency, which means achieving better returns from existing water uses. The governments of the region prioritize water policy in exactly the reverse order. Productive efficiency is benign. All that is required is investment. There need be no political stress associated with improvements in productive efficiency. Investment and changes in management and in technology are the means by which improvements in productive efficiency can be achieved.

The current inefficient use of water calls out for the adoption of modern irrigation systems, a vital option to conserve water and increase value-added in the sector. Modern systems provide efficiency improvements from 45% in the case of traditional methods to 70 to 80% in the modern system of sprinklers and drip. The adoption rate is much higher in vegetable production, where about 60% of farmers are using modern techniques, compared to fruit growing, where only 18% are using modern techniques of irrigation.

Advanced technology in applying, conveying and supplying modern systems increases the overall availability of water and improves water use efficiency. Farmers are increasingly switching from traditional surface methods, using furrow basins, to modern techniques, such as drip and sprinklers. The most advanced technology includes drip irrigation, micro-jet irrigation and surge flow irrigation. These technologies are capital and management intensive, their adoption is often costly to replace the system in place, but in many cases the benefits of switching to an efficient system pays in the long term. This option is often very attractive in the Arab region due to water scarcity.

Experience from the Palestinian Territories provides an interesting case, where on average the saving in water in changing from surface to drip irrigation is 529 m³/dunum, with the highest saving being 1 393 m³/dunum for banana and the lowest being 249 m³/dunum for tomatoes. There is a direct relationship between cost of water and adoption rate. In areas like Jenin and Tulkarem, where the cost of water is as high as \$US 0.21 to 0.34/m³, it takes only a few years (1 to 4) to recover the investment cost of modern technology. In comparison, the low cost of water in the Jordan Valley is discouraging farmers from switching to water-saving technology as it takes as much as 9 to 16 years for vegetables producers to recover investment costs. Clearly, the low price of water does not provide any incentive for farmers to adopt water-saving technology.

3.3. COST RECOVERY

The issue of allocative efficiency is closely tied to water pricing in different sectors and subsectors of the economy. In water-short circumstances, according to basic economic principles, water should be allocated to uses which bring the best return to water. At farm level, water should be allocated to crops which bring a sound return to water as well as sound economic returns to the economy - for example, high-value vegetables rather than livestock, or at least livestock raised on locally grown fodder in some countries.

At the sectoral level, policy failure is evident as the average price of water is very low in comparison to the marginal value of water for most of the high-value crops grown in the region, often sending wrong signals to the farmers as to the true scarcity value of water, and it entails incentive for rent seeking. In the irrigated areas, water charges in most cases are typically well below full recovery levels. Subsidies on water are often justified as a means of offsetting low farm incomes brought about by controlled producer prices and often direct and indirect policy distortions. It is also argued that the services provided by public institutions in delivering water when and where needed are at best poor, and, as such, water price hikes

should be linked to improvement in the services. In many cases, the marginal expenditures have gone more to expanding administrative machinery rather than improving services, cost recovery and better maintenance.

Water pricing experience is drawn both from surface and groundwater in the region. In Yemen, in the spate-irrigated areas, water charges were (and still are) never implemented seriously and revenues realized are typically well below cost recovery levels. In the northern provinces, a charge equivalent to 2% of the gross agricultural production was proposed to be paid by farmers as a cost of water. Similarly, in the south, farmers operating within cooperative societies paid very little - one dinar per feddan - as water charges, except for cotton, for which farmers were paying only half a dinar. This rate was not sufficient to recover even O&M costs, and the Ministry of Agriculture and Water Resources proposed a new rate, which was five times the current rate. However, the proposed rate needs to be implemented.

In the Jordan Valley, the past irrigation tariff entailed a subsidy ranging from 31.5 to 53.8 fils per cubic metre, depending on the season. This implied that irrigation water was subsidized, with no cross-subsidy comparable to the municipal and industrial water tariffs, where the high block water consumers subsidize the lower block consumers. In 1992, the Government of Jordan contributed JD 1.44 million in subsidies to cover the cost of irrigation water supply. Furthermore, O&M costs were estimated at JD 2.18 million (150×10⁶m³ of irrigation water was sold), while only JD 900 000, or 41% of the O&M cost, was collected from farmers in the same year.

In the Palestinian Territories, spring water is heavily underpriced in the agriculture sector and overpriced for domestic use. The price of water is almost zero in the case of spring water. The cost of water to the farmer having owner's rights for spring water in the Jordan Valley and Nabulus areas is only \$US 0.045/m³, and farmers without ownership rights rent the water at \$US 0.08/m³. About 5% of spring water is rented in the Jordan valley. Irrigation water from wells, on average costing \$US 0.076, is almost equal to the market price for spring water.

Traditionally, irrigation water in Egypt has been provided free of charge to farmers, and the Ministry of Public Works and Water Resources is responsible for O&M and rehabilitation of irrigation and drainage systems. In old lands, farmers are responsible only for their own *mesqas*, while in the new lands, tertiary-level O&M costs would be recovered from farmers. Farmers will also contribute to the capital cost of on-farm works. In addition, farmers are paying for the cost of installing tile drainage, but payments are interest-free for 20 years. Reported estimates of the cost of irrigation water vary from one study to another. Some studies estimated the cost at LE 1.92/1 000 m³. In 1984, the cost of irrigation water in Upper and Middle Egypt was estimated to be in the range of LE 9.46 to 18.8/1 000 m³. Recent studies estimated the shadow price of irrigation water at LE 0.05/m³, and the World Bank used LE 0.07/m³ as the economic cost of irrigation water.

In Sudan, the water price charged by the Ministry of Irrigation to recover O&M and capital costs was always questioned by the farmers' association on the grounds that an increasing part of revenues was used to support huge governmental bureaucracy, which - at best - had problems in providing water to the farmers when and where it was needed. This debate has culminated in a major policy shift in favour of farmers: to let irrigation water be provided through commercial supply and distribution networks. This will ensure efficiency, equity and resource conservation in water resources use in the country.

Four sources of water are used for irrigation in Syria, namely deep well; shallow well; pumping from rivers; and government projects. Irrigation rates are nominal and do not rationalize the use of agricultural water. In view of increasing scarcity, the high cost of new investments, and negligible O&M expenditures, the Government of Syria has started charging for irrigation water. In 1993, irrigation cost was estimated at between LS 1 718 and LS 3 562/ha, but rates were set at LS 2 500/ha. It is estimated that a price of LS 5 000/ha would cover the O&M costs. At the same time, the high cost associated with land reclamation compelled the government to charge land reclamation fees of LS 100 000/ha, to be paid over 25 years.

Groundwater is by and large entirely owned by the private sector in most countries of the Near East Region. The price of water is almost equivalent to the cost of pumping water. The implicit subsidy is the difference between the pumping costs and the willingness to pay. In Yemen, according to the analysis carried out recently on the cost of producing water for two regions (Ta'iz and Tihema) the average cost comes to YRIs 8/m³, which is far less than the YRIs 100/m³ willingly paid by different users. In the long run, this price differential will put pressure on agriculture to release the water, with allocation towards higher-value use. The water for domestic use is often mined from deep wells.

In Syria, the price of groundwater to private users varies from one source to another. Pumping water from deep and shallow wells costs LS 1.45 and 0.89/m³, respectively. Water pumped from rivers costs only LS 0.54/m³. On average, wheat requires between 4 500 and 6 000 m³/ha, which translates into costs of LS 6 525 to 8 700/ha to raise wheat using deep-well water for irrigation. This cost or price represents the opportunity cost of water in producing irrigated wheat in Syria. In other words, this is the minimum farmers are willing to pay for an extra unit of water and one can use this as a proxy price for water provided by government projects.

Consequently, the magnitude of 'subsidy' can be evaluated by comparing the price or cost of water with its marginal value product. The computation of the per-cubic-metre cost of water compared with imputed returns to one cubic metre of water for selected crops in Egypt, Jordan, the Palestinian Territories, Syria and Yemen revealed many interesting points. For example, the very low prices of water in Egypt and Syria provide incentives to cash in on the enormous rent from growing high value crops that bring maximum return per unit of water. In the Palestinian Territories, the groundwater price is \$US 0.16/m³, compared to a value of water of from \$US 0.33/m³ for citrus, to \$US 1.87-2.9/m³ for potatoes, tomatoes and peppers grown in protected cultivation. At the same time, the high cost of water in the highlands induces farmers to grow only a few, profitable crops. In Yemen, the value added by one cubic metre of water to kat is very high compared with any other crop grown, and farmers are even switching away from cash crops, seriously affecting foreign exchange potential and the food security situation.

In summary, a combination of economic and non-economic tools, such as charge systems, fiscal instruments, property rights and market creation, would be required to achieve sustainable water resources development. It would ensure that consumers of water paid for the real cost of providing each cubic metre of water. The sustainability of the economy at large and the agricultural sector in particular would require that economic and environmental policies complement each other, and hence bringing in economic instruments such as water pricing is a step forward in addressing environmental and sustainability concerns in water resources. If these policies turn out to be distributionally regressive for poor farmers, one can look into the possibility of market creation by giving water rights to the poor, which they can trade freely. Farmers could sell these rights to the users offering the highest return per cubic metre of water. The two economic instruments - water markets and water rights - are of great importance in designing sustainable water and agriculture sector policies.

4. CONCLUSIONS AND LESSONS LEARNT

In conclusion, lessons learnt from the region indicate that sustainable agricultural and rural development, including the efficient management of scarce natural resources, cannot be achieved in the absence of an enabling macro-economic and sector policy environment capable of clearly transforming market signals to producers, encouraging them not only to enhance production according to comparative advantage indicators, but also to maintain scarce resources, and especially water resources.

Based on FAO experience in providing policy advice to countries of the region in reforming agricultural policies and SAPs, some conclusions can be drawn concerning water subsector reform in the region. Experience shows that implementing coherent packages of reforms (macro-economic, sectoral and subsectoral) creates an enabling environment for economic growth and for implementing successful water reform. All countries who adopted piecemeal

policy reform solutions for their water planning and reform seem not to have achieved the desired or declared objective of sustainable development. The scarcity of natural resources, especially land and water, predates efficient management. It is expected that macro-economic and other policy reform measures should correct previously existing market distortions that have resulted in resource depletion, poor maintenance of resources, excess use of chemicals, and disincentives to rationalize land and water use in the Region.

In some countries, undertaking water price reforms is very difficult. Due to political, religious and cultural pressures, rural and urban users resist paying even O&M costs of water delivery. In some cases, the transaction cost of switching to an efficient system may prohibit reforms. It is strongly recommended that in such cases governments adopt non-price measures, such as transferring management responsibilities to WUAs and promoting water rights and markets. It is argued that trading in water rights promotes water use efficiency, as markets allocate water to its highest-value use. It is noticed that subsidies on water are enjoyed by the farmers in many countries of the region. These subsidies, on the one hand, have become a fiscal drain on the public sector, and, on the other hand, generate enormous economic rent, as shown above. In some countries, where water charges have been adopted, water charges for surface water supply are often based on the acreage rather than on volume; any additional water a farmer applies has zero marginal cost. In other words, the current tariff rates provide no incentive to conserve water. This is one of the major causes of overall water scarcity and depletion of groundwater and decrease in overall productivity of agriculture. Furthermore, the analysis illustrates that low prices for water provide no incentives for farmers to adopt water-saving technology.

It has become evident that, in order to reap the full benefit from water policy reform, other, complementary, policies should be adopted. These complementary policies include a wide spectrum of measures, such as strengthening research and extension, improving rural infrastructure, improving rural human capital, regulating property rights and setting up safety nets to mitigate the short-term social costs of water policy reform. Also, it is clear that sustainable food security in the region is not possible without careful water management. Deforestation of watersheds, by inappropriate or non-existent pricing policies, and by ineffective state and local collective action, makes water management a very hard task in the Region. Past policies have seriously weakened growth and poverty alleviation by blunting farmers' incentives and by distorting relative scarcities; such distortions must be removed. At the same time, however, it is essential that the 'tragedy of the commons' be averted through the proper assignment of property rights in agricultural and marginal land and in water. Only if these problems are confronted will macro-economic and sector policy reforms succeed in promoting long-term growth, sustainable food security and poverty alleviation.

Experience from the region show that three factors - low yields, economic cost of water, and low international price for wheat - have kept social profitability negative. Improving productivity, use of efficient water technology and favourable international prices provide incentives for some countries in the region with reasonable water resources, e.g., Iraq, Pakistan, Sudan and Turkey, to produce wheat not only for domestic needs but also for the Region.

Experience also shows that components of water policy reform should be carefully designed in accordance with existing economic, social and political conditions in each country. These country-specific conditions should be considered in the design, speed and sequence of water policy reform. Proper sequencing of overall policy reforms is of great importance. Morocco's experience showed that strengthening the country's external position preceded the liberalization of the trade regime. In other countries, such as Egypt, where the agriculture sector has deeply rooted structural problems, policy reform in the agriculture sector was preceded by other policy reforms. Experiences in countries of the region also indicate that the sustained and continued implementation of a comprehensive policy reform package, including water policy reform, is an essential element in achieving the full benefit of implementing any reform programme.

The above analysis shows that due considerations should be given to strengthen the new role of government in managing the water subsector. The new role of government, while not involving extensive intervention in production and physical distribution of activities, is becoming more important and more challenging. In that regard, experience in the region indicates the need to coordinate and streamline responsibilities among the several institutions and agencies responsible for water-related planning and policies within each country. Also, enhancing the efficiency of government's role in managing the water sector may dictate the need to increase the allocation of direct investment in developing and maintaining the irrigation system and reducing the huge expenditure typically allocated to cover the costs of the inflated statal administration. Water policy reform should include the necessary institutional reform.

It has become evident that delaying water policy reform is costly. Such delay may increase the social cost of reform in the short term and add to the serious depletion of the already scarce natural resources. Experience shows that reform programmes should not be delayed. They should be implemented progressively. Water policy reform should not be viewed only as a response to serious economic problems but also as a first step towards developing a long-term sustainable agricultural development strategy. Water policy reform is a dynamic and flexible process that must be sustained. Its ultimate goal is to remove any inefficiencies in the system. Many countries of the Region have undertaken different measures and instruments for water policy reform. In most of these countries, the measures adopted are to be implemented gradually over a long time. Gradual and progressive implementation of water reform policies seems to be more acceptable in the Region. Actually, macro-economic and sectoral policy reforms, including water cost recovery and other measures, may have negative short-term impacts on poor and small-scale farmers. Thus, placing greater emphasis on the social cost of water policy reform and protecting the low-income segment of the population should be considered through income generation activities.

Experience shows that economic reform - including water policy reform - should be looked at as a continuous process to place the economy and the agricultural sector on the right development path. This continuous process should involve people's participation at the design, implementation and monitoring stages. In the Near East, there seems to be a need for an increasing number of private sector groups, including WUAs and other NGOs, to take over some public sector irrigation responsibilities. The inclusion of water users in irrigation planning, management and ownership is proving to be an effective method for increasing irrigation system efficiency in many cases. Studies worldwide demonstrate that user participation in irrigation services improves access to information, reduces monitoring costs, establishes a sense of ownership among users and increases transparency as well as accountability in decision making.

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