

# Water Management in the Maghreb

MAHMOOD ALI AYUB AND ULRICH KUFFNER

Division Chief  
Middle East & North Africa

Principal Water Resource Engineer  
Europe & Central Asia/Middle East & North Africa  
The World Bank

**A**S THE MAGHREB countries look for ways to tackle an impending water crisis, it is becoming clear that governments must move away from the traditional supply-oriented, agency-specific policies. The best hope lies in a comprehensive approach that focuses on managing demand.

During the past few decades, the Maghreb countries—Algeria, Morocco, and Tunisia—have invested heavily in water development works to tackle the serious problems imposed by an arid/semiarid climate with highly variable and irregular rainfall and limited water resources. They have built dams, canals, wells, irrigation schemes, and water supply systems, with impressive results. From 1970 to 1990, the irrigated area increased by almost 80 percent, and nearly all urban dwellers in the Maghreb countries, and a large part of the rural population in Tunisia, gained access to safe drinking water. The improved water infrastructure has stimulated economic growth and reduced somewhat the damaging effects of droughts.

But these North African countries are entering a critical phase. At current demand levels, available water resources will be almost completely used up within the next 15–20 years. Tunisia may reach this point even earlier as it now uses over 75 percent of its annually renewable water resources. Moreover, water demand will continue to rise rapidly because of growing populations and expanding economies. At the same time, the remaining opportunities for building dams

and exploiting groundwater will become more and more expensive, and widespread water pollution will further whittle down the available supply. Thus, the Maghreb needs to move quickly to overhaul its approach to water management.

## Water management problems

**Water shortages.** The rainfall in the Maghreb countries is concentrated along the northern coastal mountain ranges, with rain mostly in the winter months and great variations from year to year. This variability introduces an element of risk, making it difficult to estimate the true opportunity cost of water (i.e., its value in the next best economic use). It means expensive storage capacity is required to utilize the seasonal and interannual flows. Systematic contingency planning is also needed to ensure proper responses to drought—a typical feature of the region and the main reason for heavy investments in water storage development.

In addition, the irregular spatial distribution of water makes it necessary to build costly transfer schemes. Almost all the major cities, such as Algiers, Casablanca, and Tunis, depend on water transfers for their water supply, and several large cities suffer water shortages—Oran, Algeria can supply drinking water for only a few hours a day during a few days a week. Making matters worse, rapid population growth is reducing, and will continue to reduce, water availability (see chart).

Faced with a shortage of renewable water, Algeria, Libya, and Tunisia have begun exploiting nonrenewable (fossil) groundwater in the Sahara. But apart from the high cost of transporting such water over long distances to the demand centers, mining groundwater is not sustainable in the long term.

**Pollution.** Water pollution began to reach dangerous levels in the 1970s as industries and growing urban centers discharged large volumes of untreated wastewater into rivers, lakes, and coastal waters. In northern Algeria,

where heavy industries are concentrated, most wastewater treatment plants do not work. In Morocco, the Sebou River's pollution level has reached crisis proportions. In Tunisia, which has already invested heavily in pollution control measures, the pollution of some coastal aquifers and beaches threatens the vital tourist industry.

But the most serious problem is the contamination of groundwater. This stems from industries' discharging untreated wastewater and depositing waste materials without special precautions (e.g., petrochemical industries in northeastern Algeria), as well as from the excessive use of agrochemicals. Since groundwater is generally accepted as the best source of drinking water, its contamination often endangers existing water supplies. Possible cleanup procedures are very expensive and time consuming.

**Institutional issues.** In a region where water sector institutions have been dominated by government, centralized public agencies have been responsible for constructing dams and canals and for building and operating irrigation and domestic and industrial water supply projects. While the actions of single-purpose agencies during periods of relative surplus were successful, governments are now being forced to consider other solutions. Governments still need to determine policies, set long-term strategies, correct market failures, and establish and enforce regulations such as quality standards. However, experience shows that independent agencies or private companies are generally better able to provide efficient water delivery services.

**Irrigation.** All Maghreb governments have ambitious plans to increase irrigated areas to better use natural resources, increase food production, develop rural areas, and generate employment. But there is growing pressure to reallocate water from irrigation—now using over 60 percent of Maghreb water—to other uses. Increased efficiencies should help: in Morocco, 10 percent of the water being used

in irrigation would provide enough to double the volume of water for domestic supply. However, if less water is available, farmers would have to abandon irrigated land or reduce water use per hectare, a possible but costly move.

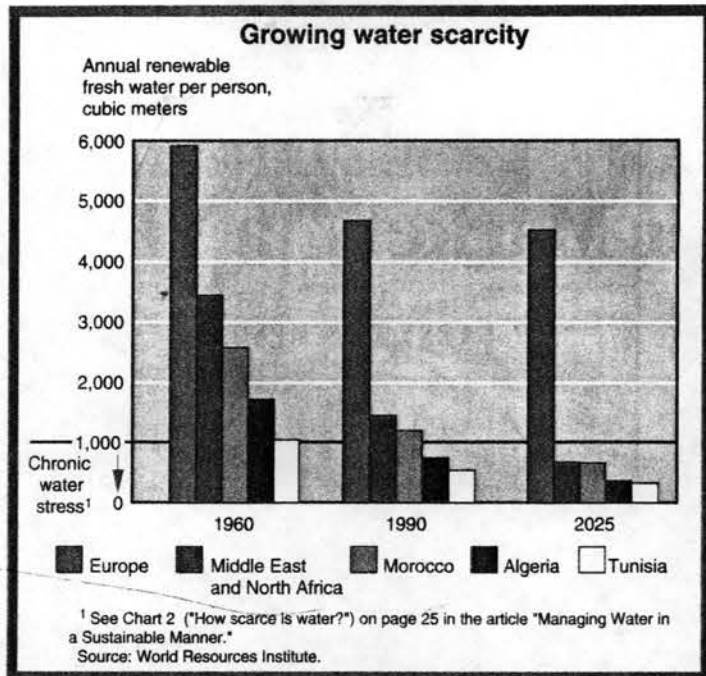
Using treated wastewater is often advocated as a solution, but it is not suitable for all crops and a thorough monitoring of water quality would be needed. In Santiago, Chile, typhoid cases rose rapidly after 16,000 hectares of vegetable field were irrigated with inadequately treated wastewater. Similarly, irrigated crops in Jordan had to be destroyed when a wastewater treatment plant malfunctioned. Moreover, treated wastewater is usually available near large cities, meaning it would have to be brought over considerable distances, often pumped, to irrigated areas.

### Toward a policy shift

Given these constraints and problems, it is becoming increasingly evident that an important policy shift is needed—one that focuses on the “demand” side (promoting more desirable levels and patterns of water use) rather than on the “supply” side (i.e., locating, developing, and exploiting new sources). This approach follows the thinking outlined in the World Bank’s new policy paper on managing water resources.

**Managing water demand.** Direct technical and regulatory measures to control water use are difficult to enforce and, therefore, rarely successful, whereas indirect measures that affect voluntary behavior—market mechanisms, financial incentives, and public awareness programs—hold much more promise. In the Maghreb, as in most other parts of the world, water charges are below levels that would cover costs, rarely approaching levels that would reduce water use. Thus, higher prices are essential for recovering costs, reducing water use, and helping to allocate water with greater value uses. Yet, in the past, raising prices has been resisted because

- water has been seen as a free good, and water charges are consequently resented;
- governments find it difficult to raise charges when incomes are low and unemployment is high (e.g., about 25 percent in Algeria);
- low irrigation water charges—generally much lower than drinking water charges—are often defended as a way to compensate farmers for low product prices (set by govern-



ments), raise their incomes, and entice them into remaining in the rural areas.

Such issues are real and are being addressed by the Maghreb governments, particularly for drinking water. In irrigation, changes are more difficult, but progress is being made. The Tunisian Government has already decided to gradually introduce prices that will cover the full cost of irrigation water.

Water agencies can also influence demand by offering incentives for adopting conservation measures, as Cyprus and Israel have shown. Measures can range from the installation of water saving fixtures to the recycling of water in industrial processes. In addition, governments could undertake stronger public education programs, stressing how to save this scarce and precious resource, as has been successfully done in Cyprus and Mexico.

**Reforming institutions** Institutional reform is a key requirement for comprehensive planning and management, yet it is one of the most difficult reforms to carry out. Given the predominance of government agencies, the first steps should consist of granting these agencies greater independence, subcontracting to private companies for nonessential activities (e.g., repairs and construction), and involving water users in the planning and operation of water systems. The governments basically back this policy, but entrenched interests tend to prolong implementation. At the same time, the agencies should concentrate on areas where they are the most efficient, taking a more comprehensive approach. Tunisia already has a well-coordinated centralized system; Morocco has a high-level coordination mechanism, although strong

government agencies still tend to pursue their own interests; and Algeria is just starting to address these issues.

### Tackling pollution

Cleaning up pollution involves massive financial resources because the cost of sewerage and wastewater treatment facilities is higher than for providing drinking water, and the necessary investments are lagging far behind water supply investments. In addition, toxic industrial effluents and deposits are endangering water resources. Even in the richest countries, cleanup efforts require that limited resources be spent on the highest-priority investments. A major initiative to deal with the worst cases is the Mediterranean Environmental

Technical Assistance Program, which has identified environmental “hot spots.” It is also necessary to develop a comprehensive pollution control approach within the corresponding hydrological units (i.e., river basins and coastal regions) to prevent recontamination of cleaned areas.

### Rethinking irrigation strategies

Because water will have to be reallocated to domestic and industrial uses in the near future, a major expansion of irrigated areas is doubtful. Moreover, the rising cost of irrigation water—because of conservation measures, the use of treated wastewater and the upward adjustment of low water charges—will force farmers to shift from low-value crops like cereals to such higher-value crops as fruits, vegetables, and flowers, for which local markets are limited and export markets are difficult to develop. Thus, traditional agriculture will not be able to expand and, in some areas, will decline in the long run.

There will be no simple solutions as conflicting interests will have to be reconciled. Besides the need for more efficient water use, other aspects (e.g., food production, employment, pollution, exports, and regional development) will have to be considered. However, since private irrigation development, in the Maghreb as elsewhere, has shown that it can operate profitably while government-dominated districts often require subsidies, a determined shift toward turning public irrigation districts over to private farmers or farmer groups is critical. ■