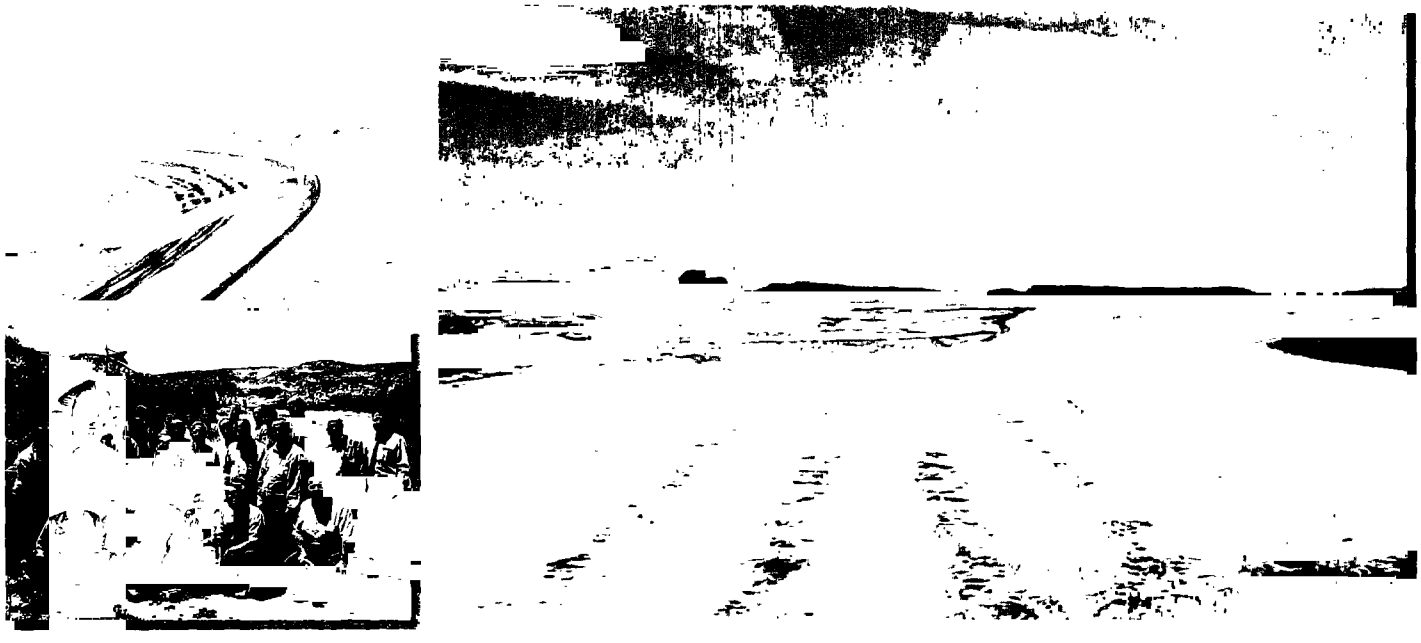
MIDDLE EAST AND NORTH AFRICA (MNA) REGIONAL WATER INITIATIVE

FIRST REGIONAL CONSULTATION ON MNA WATER CHALLENGES AND PREPARATION FOR THE THIRD WORLD WATER FORUM



SUMMARY REPORT

SPAIN, JUNE 10-12, 2002

The World Bank

World Water Council
3rd World Water Forum

MIDDLE EAST AND NORTH AFRICA (MNA) – REGIONAL WATER INITIATIVE
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Sponsored by: The 3rd World Water Forum Secretariat
The World Bank

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Foreword

The Regional Consultation on MNA water challenges and 3rd World Water Forum (3WWF) preparation took place in the framework of the Partnership Program between the MNA Water Initiative and the 3WWF Secretariat. The objective of the Partnership Program is to assist the MNA Region in the preparation of the Forum, while at the same time generate knowledge on key water issues relevant to countries of the region and build partnerships for information exchange and dissemination.

The Regional Consultation was held in Spain, June 10-12, 2002 and included site visits to learn about good practices and innovative methods in groundwater resources management as well as in private sector participation. Case studies from Spain, Jordan, South Western US, and Morocco were presented. Representatives from ten countries of the Region, including high-level delegates, participated in the Consultation. In addition were representatives from partner organizations--3rd World Water Forum, the World Water Council and the Islamic Development Bank.

Many people contributed to the success of this Consultation. First of all, we would like to thank the Metropolitan Area of Barcelona, the Ministry of Environment, the Catalan Agency for Water and the Segura River Basin Authority in Spain for their generous hospitality and extensive assistance in the preparation of the Consultation. In particular, we would like to thank Mr. José Cuevas, President of the Metropolitan Area of Barcelona, Mr. Ramon Alvarez, Director-General for Water Resources and Water Quality, and Mr. Juan Canovas, President of the Segura River Basin Authority. We would like to extend our appreciation to the Baix Llobregat Users Association's excellent presentations and to Mr. Francisco del Amor, President of the Mula Water Users Association, for the well-appreciated and enlightening presentation on the Mula Irrigation Modernization Plan. Professor Ramon Llamas, from the Marcelino Botín Foundation, provided stimulating remarks at the Consultation. The relentless efforts made by Ms. Josefina Maestu (University of Alcala de Henares and World Bank consultant) throughout the consultation are also gratefully acknowledged. Thanks are extended to the other resource persons for their presentations—Dr. Elias Salameh, University of Jordan, Mr. Sixto Requena, World Bank consultant and Dr. Rashid Al-Hmoud, assistant Professor of Economics at Texas Tech University, USA.

Our thanks are, of course, due to the workshop participants themselves whose critical involvement and dedication to learning made the consultation a successful event.

The contributions of many World Bank staff were instrumental in achieving the consultation's success. A special word of thanks is due to the support provided by the Regional Water Initiative Team of Vahid Alavian, Satoru Ueda, Ashok Subramanian, Nathalie Abu-Ata and Josephine Onwuemene.

Salah Darghouth
The World Bank

Kenzo Hiroki
The 3rd World Water Forum Secretariat

ACRONYMS

ADWR	Arizona Department of Water Resources
AMA	Active Management Area (Arizona)
AWS	Assured Water Supply Rules (Arizona)
BOT	Build, Operate and Transfer
BOT-C	BOT Concessions
CAGRD	Central Arizona Groundwater Replenish District
CAP	Central Arizona Project
CC	Concession contracts
CUADLL	Water Users Association of the Delta of the Baix Llobregat
FCIHS	Foundation International Center for Groundwater Hydrology
GUA	Groundwater User Associations
GW	Groundwater
INA	Irrigation Non-expansion Area
LOT	Lease, Operate and Transfer
m^3	Cubic Meters
MNA	Middle East and North Africa
MWI	Ministry of Water and Irrigation (Jordan)
RWI	Regional Water Initiative
RWPG	Regional Water Planning Groups (Arizona)
TNRCC	Texas Natural Resources Conservation Commission
TPWD	Texas Water Department Board
O&M	Operations and Maintenance
OSE	Office of the State Engineer (New Mexico)
PET	Potential Evapotranspiration
PGMA	Primary Groundwater Management Areas (Texas)
PPP	Public Private Partnership
RBA	River Basin Authority
STC	Shadow Toll Contract
WRM	Water Resources Management
WWF	World Water Forum

SUMMARY OF THE CONSULTATION

1

INTRODUCTION

The Middle East and North Africa (MNA) Region, which extends from Iran to Morocco, is composed of countries which share similar types of agro-climate conditions. This area is the most water scarce region in the world and the water stress is increasingly affecting economic and social development. While conventional water availability remains relatively constant, demand is increasing sharply as a result of population growth, increases in household income, and irrigation development.

Following the decision of the Regional Economic Summit held in Amman in October 1995 to address the overall water scarcity in the MNA region and its impact on economic development, the MNA Regional Water Initiative (RWI) was launched to facilitate water policy reforms in countries of the region through (i) knowledge and experience sharing, (ii) analytical and sector work support, and (iii) establishment and strengthening of partnerships. Two seminars on policy reforms in Water Resources Management (WRM) were organized in 1998 and 1999, followed by a series of workshops on groundwater management and water reuse, respectively in 2000, in Sana'a, Yemen and in 2001, in Cairo, Egypt.

Recently, the MNA RWI established a partnership with the Third World Water Forum Secretariat(3WWF) to assist countries of the region to prepare for the 3WWF, Kyoto, March 2003. The Spain Regional Consultation was the first meeting to be held as part of the Partnership.

The purpose of the Regional Consultation was two-fold: (i) to present preliminary findings of some of the RWI analytical work activities, including sustainable groundwater management and public-private partnerships in irrigation and water resources management and gather feedback from the countries; and (ii) to discuss preparation for the 3WWF, including priority themes to be addressed at the Forum as well as the organization and structure of a Regional Day specifically dedicated to common water challenges in the Region. The Regional Day in Kyoto represents an opportunity to communicate to the rest of the world the key water challenges of the Region and solutions proposed to address those challenges.

In an effort to promote the exchange of ideas and experiences, water management practices in Spain were presented to the participants through case studies and field visits. Spain, which shares similar water challenges with a number of MNA countries, has been successful, in part, in developing solutions to address water scarcity, both at the technical and policy levels. In addition, other case studies from within and outside the region

contributed to broaden the scope of the discussions drawing on experiences from Jordan, Morocco and the Southwestern United States.

This report does not necessarily reflect the World Bank's official policy regarding water resources management, but is instead a working document, which will be strengthened with additional case studies, as needed.

The present report is divided into seven sections. Second 2 summarizes the groundwater case studies and highlights some of the key issues related to institutional and organizational aspects, regulatory measures and incentives for sustainable groundwater management. The Spain case studies emphasize the importance of participatory management in groundwater resources while the cases studies from the Southwestern United States highlight the role of public action. The case of Jordan offers an illustration on the use of strict monitoring and enforcement measures related to groundwater resources extraction.

Section 3 presents options for public-private partnerships in irrigation in MNA countries and is a preliminary note to be expanded and completed before 3WWF.

Section 4 presents a summary of the discussion session by country delegates on sustainable groundwater use and public-private partnerships.

The outcome of the discussions on the preparation for the 3WWF Regional Day are presented in Section 5, including a series of follow-up actions for countries and partner organizations from June 2002 until March 2003.

Section 6 identifies lessons learned and guidelines for preparation towards the 3WWF.

Finally, Section 7 draws some major lessons learnt from the above-mentioned case studies and places them in context as we move forward in preparation for the 3rd World Water Forum.

2

GROUNDWATER AND AQUIFER MANAGEMENT

2.1 Introduction

The MNA Region is one of the driest in the world. Groundwater plays a key strategic role in the region. Most surface water is highly seasonal and expensive to transport but groundwater is available throughout the year and is of better quality than surface water. It acts as a strategic buffer and serves both domestic and agricultural irrigation needs. Groundwater today suffers overexploitation and pollution and this can endanger the livelihoods of those depending on these resources.

The June 2000 Regional Groundwater Workshop in Sana'a, Republic of Yemen, co-sponsored by the Swiss Agency for Development and Cooperation, focused on the legal, institutional, economic and socio-political factors affecting groundwater management in participating countries.

The workshop helped advance common understanding as to the extent of the problem in MNA countries, the limits of supply side management and the risks involved in the use of non-renewable groundwater. Some of the implementation problems in improving groundwater management included the problems of data, information and understanding, the need for institutional and legal reform, the problem of fragmentation of responsibilities in government, the difficulties in issuing and enforcing permits, and regulating groundwater use. The main points emerging from the Workshop were as follows:

- A partnership between users and government authorities is needed where the administration can assess and disseminate information and bring users together at the aquifer level, providing incentives to do so, and where local users determine rules, monitor compliance and mediate in case of dispute.

- There might be a need for the administration to strengthen and reorient its role in aquifer management, from predominantly top-down design and enforcement of rules to information dissemination and facilitation of joint decision-making processes, including improving monitoring systems and access to information.

- In most cases, there needs to be a shift from expanding supply to managing demand of groundwater resources, including improved

irrigation techniques and changes in cropping patterns.

- Implementing changes in aquifer management requires addressing the issue of defining and clarifying water rights. This often may require Water Law reforms to reconcile public ownership of water and individual rights of use.

- Evaluation of international case studies of participatory aquifer management is needed to address institutional and practical issues.

The Spain Regional Consultation took on the challenge of "drilling into" existing experiences of aquifer management in places where there had been improvements. The cases were chosen from Spain, Jordan and the Western U.S., places with similar climatic conditions as those found in the MNA countries and facing similar conditions of overexploitation and generalized scarcity.

The objective was to analyze institutional arrangements (role of different stakeholders, legislation, water rights system), and actions and useful measures that have led to improved groundwater and aquifer management (socio-economic measures, technical measures, regulatory measures). Moreover, the objective was also to see how the stakeholders involved dealt with some of the major problems of implementation, how barriers to change were overcome and what were the major critical factors that triggered change. The objective was then to focus not only on instruments for improved groundwater management but also on the major enabling preconditions, institutional arrangements and the process of implementation of changes in policies and actions.

2.2 Spain Groundwater Management. From private property to public domain and joint management by River Basin Authorities and User Associations.

2.2.1 Introduction to the Evolution of Aquifer Management in Spain[1]

Spain has important groundwater renewable resources (average of 27,000 million cubic meters). Groundwater has been increasingly used by farmers (especially small farmers) but also by cities and industries that consider it a strategic resource. Groundwater abstractions have increased in Spain from 500 million cubic meters in 1,900 to 5,600 million cubic meters in 1996. Agriculture represents 75% of total groundwater abstractions in the country; 20% is used by cities and 5% by industries. Spain is one of the countries in the region that has the highest number of wells per capita (estimated about 1 million wells). The factors driving increased groundwater use have been lower drilling costs, the invention of the multistage pump, a greater knowledge of hydrogeology and the imitation effect among users because of the good benefit/cost ratio.

Generally, groundwater development has had positive economic and social impacts. However, in some cases, it has caused negative impacts such as depletion of hydraulic head, groundwater quality degradation, subsidence or land collapse, interference with other water developments, and adverse impact on aquatic ecosystems.

Changes in groundwater management in Spain have been accompanied by a number of legislative developments. According to the *Water Act of **1879**,* groundwater belonged to the owners of the land above it. Farmers using surface water had to, as early as 1879, organize in irrigation associations. As a result, more than 3000 associations exist today. It is only after the *Water Act of **1985*** that groundwater became public domain and its use was regulated by the Law. The new law makes compulsory the registration of existing and new users and allows River Basin Authorities (RBA) to intervene directly in the aquifers declared over-exploited.

[1] Presentation by Prof. Ramon Llamas, Professor of Hydrogeology, Madrid University.

Participation of groundwater users in aquifer management is introduced through Water Users Associations and users are represented in RBA governing and management bodies. The regulatory framework was completed by the abstraction regime defined in *The Basin Water Plans* (1998). The latest *Reform of the Water Act* (1999) also allows water transactions to take place among different users.

In Spain, RBAs have played a central role in water resources management since **1929** (Today, there are 11 Basin Authorities and 2 Island Authorities). RBAs build and manage major infrastructures and are in charge of monitoring quantity and quality of surface and groundwater; they prepare water management plans, keep inventories, issue licenses and permissions, inspect and police licenses, charge fees to water users, and so forth. Their coverage areas coincide with hydrological boundaries. Also, Water User Associations play a key role for water resources management in cooperation with RBA.

The *1985 Water Law* defined and made the establishment of groundwater user associations (GUA) compulsory in overexploited aquifers. GUAs are not private associations but "Public Law Corporations." They are regulated by the 1985 Law that establishes how to create them, how they are organized and the decision-making processes vis-à-vis the RBA. Although the law states that GUAs can manage the aquifers with the character of "public" organizations they remain under the supervision of the RBA. They are democratic organizations, which give them legitimacy to implement control actions. They are represented in the RBA, where the Management Committee is elected by a general assembly of users. The Committee implements the agreements decided in the Assembly, and in case of conflict, users have agreed that the Jury has the power to make the ultimate decision.

The lessons learned from the experiences of groundwater management in Spain indicate the importance of education campaigns, effective information dissemination, user participations, clear identification of water rights, the need for phasing out the *subsidy culture*, the importance of promoting GUAs, and the need to give increasing attention to groundwater pollution. Other key lessons include the need to establish and to reform the RBA and the importance of adapted management to local conditions and necessities.

2.2.2 Case Study on Participatory Aquifer Management in The Delta of Llobregat (Barcelona)[2]

In the Delta of the Llobregat River in Barcelona, the Baix Llobregat Delta User Association (CUADLL) was created in 1976 as a result of social alarm triggered by rapid depletion of the water table as well as deteriorating water quality in the aquifers. This led to an increase in the cost of water purification and abstraction, which had the potential of endangering the survival of cities and key industries in the area. Social alarm was also triggered by plans for a new dock in the port that was feared would worsen seawater intrusion. The aquifer now supplies water to City of Barcelona (Water Supply Company of Barcelona - AGBAR), towns, industries, and irrigation areas. It has a strategic value given its location, especially during incidents of drought or pollution.

The CUADLL (initially led and promoted by one of the municipal governments) committed itself to establishing sustainable aquifer use and raising public awareness about the value and importance of protecting the aquifer. It defined its basic objectives as (i) promoting the reduction of abstractions; (ii) insuring adequate replenishment of the aquifer; (iii) improving water quality; (iv) managing the common interests; and (v) carrying out awareness campaigns among the population.

[2] Presentations by Andreu Galofré (Catalan Water Agency); Fidel Ribera (FCIHS); Joan Codina, Jose María Niñerola and Josep Ferret (water users association) and overview by Josefina Maestu (University of Alcala and World Bank Consultant).

Today, the Association has groundwater users registered in the official "Water Registry" and is preparing a full inventory of existing wells. It collaborates with the RBA on various activities including conducting studies on the characteristics and the state of exploitation of the aquifer (including evolution of problems of sea water intrusion and pollution), publishing opinion articles in major newspapers and participating in open and expert *fora* to inform the general public and to seek their support. However, it was faced initially with limitations and difficulties due to lack of a regulatory framework.

The 1985 Water Law placed groundwater in the public domain and enabled the Basin Authority to declare an aquifer over-exploited, and intervened in the aquifer. The Law also provided all water users (previously only surface water users) with the rights of constituting user associations and participating in basin authorities' decision making. Today, the CUADLL is composed of a General Assembly, Governing Board, Arbitrator, Technical Commission, Water Police, etc. to protect the common interests and acquired water rights, and to establish appropriate aquifer management norms. It possesses an independent legal status that allows it to enforce the decisions of the Board in association with the Catalan River Basin Authority. These efforts have greatly contributed to turning around the trend of aquifer depletion.

For the CUADLL to successfully perform its duties, the Water Administration had to delegate some of its water resources management tasks. As a result, the Association has become "the hands and eyes of the administration" in the area. At the same time, the CUADLL demands support from the administration (RBA) in the application of prevailing rules and laws. The CUADLL collects information and reports regularly to the RBA on all the water extracted by users and on any changes in water use. The Association charges a fee to members to cover its management costs, according to usage. The CUADLL has advised the Water Administration against giving any new permits for abstraction of water from the aquifer, when this will increase the total water abstractions or when the balance of the aquifer is negative.

The Water Users Association is run mainly on a volunteer basis with a minimum administrative staff. It relies on contributions from members in terms of time or funds. The WVA also facilitates and implements actions such as monitoring or artificial recharge with only indirect compensation (i.e., increased quota of water use to water company in relation to recharge). It also influences regional policy makers through the municipalities on proposed land use changes.

2.2.3 Case Study of Mula (Murcia). Modernization of a Traditional Irrigation district by a Water Users Association[3].

Mula County has a precipitation of around 200-300 mm per year. Potential evapotranspiration is high, averaging 1200-1300 mm per year. It is a semi-desert area. Until a few years ago, the traditional basin irrigation was characterized by old and deteriorated irrigation networks causing high water losses. It was on the brink of land abandonment and desertification. However, with the support of the Murcia Regional Government and other institutions such as the High Council for Research, the local farmers introduced modern micro-irrigation networks with computerized automation systems connecting wells, small reservoirs, pumping stations, etc. on a community basis. The irrigation system covers a hilly area of about 2,000 hectares and divided into seven main plots. There are a total of 4,000 land holdings belonging to 1,700 farmers. The main products are fruits, citrus and flowers. The irrigation area uses both surface and groundwater. The wells are 200m deep and the water depth is 130m. The two wells have a capacity of 130 l/s and 70 l/s respectively.

[3] Presentation by Francisco del Amor, president of the Mula Water Users Association.

The design choices and operational practices, consistent with the local crop requirements and farmers capacities, were decided by the irrigation users, and now, the irrigation network is centralized/owned by the Irrigators User Association. Sixty-eight percent of farmers are small holders owning farms of less than one hectare. This participatory approach with an integrated water resources management accomplished: (i) sustainable exploitation of the aquifer; (ii) maintenance of water quality; (iii) equitable distribution of irrigation water; (iv) ecosystem conservation; and (v) improved living quality for irrigators.

One of the prominent features of the water distribution is a computerized automation system. Each farmer has a "water account," similar to a bank account in which all water allocation and transactions (withdrawals) are indicated. Each irrigator has his own "water book" where all his water and fertilizer transactions are registered. Another interesting innovation is the "water teller machine," which is similar to a banking teller and cash dispensing machine located outside of the Association's headquarters office. Farmers can program the irrigation opening/closing and verify water withdrawal volume by these machines. The Community also has a distribution plan of irrigation and fertilization at the same time. Water carries the dissolved fertilizers that each kind of irrigation crop requires and according to the requests of farmers.

It was reported that water loss was reduced from 1.2 to 0.14 million cubic meters by the introduction of the system, in addition to other benefits, such as energy cost savings, savings in fertilizer used (around 45,000 fertilizing units) agricultural production increases, etc. The Segura River Basin Authority also works with the Association to manage and control groundwater and surface water through inventorying, monitoring, licensing, etc.

2.3 Improving Groundwater Management through Government Action in Jordan[4]

In Jordan, the Ministry of Water and Irrigation (MWI) has all the responsibilities of water resources management. It regulates the use of water, prevents its waste, conserves consumption, levies and collects tariffs, and gives water extraction permits. The law states that water is public property and under control of the government.

In the early 1990s, the MWI established a by-law prohibiting the drilling of new wells in most parts of the country, where aquifers were afflicted by depletion and quality degradation. Only new wells for governmental municipal water supply, universities, hospitals, and military camps were exempted from this by-law. In addition, repairs of existing wells were allowed only if the same specifications of the original wells were used. All drilling companies were notified of the fines against those who violated the regulation under the by-law. If a drilling rig was found at an unlicensed well, the rig would be confiscated and the drilling team would be arrested. They would be released only after paying an appropriate fine and a bail. The regulation has been enforced strictly, with very few exceptions.

The MWI went to great lengths to control the wells. It took around ten years to accomplish a full inventory. Fieldwork was carried out all over the country to register wells, measure coordinates and obtain information on depth, water level, year of drilling, water use, etc. As a result, the Ministry has files for nearly all wells in the country whether they are licensed or illegal. The total number of wells in 2000 was 2,449; of which 1,830 were used for irrigation, 450 for municipal supply and 169 for mainly industrial uses. In general, water levels are deep, 100-200 m below ground surface.

[4] Presentation by Dr. Elias Salameh, University of Jordan.

In 1998, a new regulation was issued, charging a price for all extracted groundwater for municipal, industrial, and commercial uses, excluding irrigation. The charge was a flat rate of US$ 0.15 per cubic meter. All wells were metered on a regular basis by the MWI, which collected fees based on the abstraction volume.

In 1999, the charge was raised to $0.37 per cubic meter. Consumers protested and threatened to press charges against the Ministry. But the Ministry did not yield to the protests and instead advised industrial users to install water saving and recycling devices. It turned out that those industrial plants succeeded in saving around 10% of water use and found the devices worth the investment.

The MWI also took an important step to install meters on all wells including those used for irrigation. The first objective was to measure the abstracted volume of water from all wells. The second objective was to remind farmers that they are allowed to abstract only the amounts of water stated on their drilling licenses.

Farmers fiercely resisted the installation of meters and some of them even destroyed meters at the beginning. To address the issue, the Ministry announced it would close any wells in which the owner hindered or destroyed the installation of the meter. Now, the Ministry is proud of the fact that the enforcement rate is about 95%. Farmers were also asked to pay for the amount of water exceeding the limits in the licenses. As a result, farmers gradually stopped selling water to others. Prior to this, they would frequently abstract water not included in the licenses for trade.

In 2002, the Cabinet of Ministers approved a new pricing policy on irrigation water—even on amounts already granted in existing licenses—with a block tariff system, where charges increase in relation to the amounts of water extracted. The Ministry instituted this new policy after conducting intensive and difficult negotiations with farmers' representatives. The new pricing system will go into effect in three years. Details of the block tariff are: abstractions from one single well of less than 150 thousand cubic meters remain free of charge; abstractions of 150 to 200 thousand cubic meters will be charged at the rate of US$ 0.036 per cubic meter; and abstractions over 200 thousand cubic meters will be charged at US$ 0.09 per cubic meter.

The introduction of this new pricing policy of irrigation water is expected to reduce greatly the amount of pumping water used for irrigation. This case may only be partially replicable to other MNA countries due to the following reasons: (i) the Jordanian government has strong capacity to enforce monitoring and regulations; (ii) water scarcity in Jordan is more severe than most other MNA countries; and (iii) the number of wells is relatively small – around 2,500 nationwide (including illegal ones) and they are located in flat terrain easily accessible by government offices.

2.4 Managing Groundwater in the Southwestern Region of the U.S. The Importance of Public Action[5] and Participation

2.4.1 The Experience of Groundwater Conservation Districts in Texas

Groundwater in Texas was recognized as the private property of landowners, in 1949, with a special legislation. The principle of ownership used in the state is the absolute ownership doctrine, in which landowners enjoy absolute freedom to use all groundwater available underneath their land. Additionally, landowners could sell the water to others for beneficial purposes either on or off the land and outside the basin where produced, just as they could sell any other property. The same legislation authorized the creation of groundwater conservation districts, which now are the only entities that are authorized to restrict the use of groundwater for aquifer conservation and land subsidence control. Groundwater conservation districts can

[5] Presentation by Dr. Rashid Al-Hmoud, Assistant Professor of Economics,Texas Tech University, USA.

be established after local residents appeal to the state to create a district.

The 1985 legislature authorized the Texas Natural Resources Conservation Commission (TNRCC) and the Texas Water Development Board (TWDB) to identify areas where critical groundwater problems exist or may exist in the near future. These agencies are also responsible for identifying and delineating Primary Groundwater Management Areas (PGMA) as well as initiating the creation of groundwater conservation districts. When the identification process is initiated, notification is sent to counties, municipalities and other entities in order to solicit comments and request data and information. The PGMA reports include evaluation and recommendations on strategies for the establishment of groundwater districts.

After considering all information and comments, the TNRCC issues an order stating its findings and conclusions on the designation of the area and benefits. The Order provides local residents with an opportunity to choose between establishing a new district or joining an existing one. If the voters elect not to create a district, the TNRCC is required to make legislative records and to provide recommendations for future management, which may include direct management by the TNRCC regional office. Areas that reject the government's recommendations are not eligible to receive any financial aid from the state, such as low-interest loans to improve their irrigation system, and are subject to regulations through the initiation of a district by the commission's local office.

Districts have varied powers including well permitting, well spacing, and determining the size of well pumps. The purpose of groundwater conservation districts is not to impose strict regulations, but rather to provide for the conservation, preservation, protection, and prevention of waste of the groundwater or reservoirs or their subdivisions. They achieve these goals through various activities and programs beginning with the principle that groundwater is privately owned by landowners. The districts are also in charge of monitoring the quantity and quality of groundwater.

- **High Plains Underground Water Conservation Districts**

Some of the districts are quite large. For example, the High Plains Underground Water Conservation District No. 1 (the District) covers 28,000 km^2 of parts or all of 15 counties. Population is 442,000. Total irrigated area is 809,400 hectare out of 1.3 million hectares of crop land. The district is governed by five boards of directors. To ensure local representation at the county level, each county elects its own county committee. There are 15 county committees in the district, with each one containing five members who are elected by each county's registered voters. County committees meet regularly with the District's manager and staff to discuss various issues, such as approving water well permits, the budget, and any other water related issues. Although Texas Water Code gives the District various options for financing its budget, the District uses property taxes as the predominant source of income.

The District requires permits for all wells capable of producing at least 265 liters per day. Individuals who wish to drill a well, equip or alter the size of the well must apply to the District. A county committee must first recommend a permit before sending it to the Board of Directors. The permit application solicits information on the exact location of the well, the location of the three nearest wells and the size of the pump. If the application is approved, the county committee recommends the size of the well pump, depending on the minimum distance to the nearest well. By signing the application, the landowner swears that the proposed well is spaced correctly. Thus, all responsibilities fall on landowners. The District is also responsible for monitoring water level in the aquifer. Currently, there are over 1,200 monitoring wells scattered across the

District. Each year, District personnel read the water level in the aquifer and compare it to the previous year's readings to check for the annual change in the water table.

The District lends money to farmers at interest rates lower than commercial rates using funds provided by the TWDB. Since 1985, the TWDB, through the Agricultural Water Conservation Equipment Loan Program, gave out over US$ 15 million to the District. As a direct result of the program, the adoption of improved irrigation techniques has increased dramatically. Today, 75% of total irrigated area in the District employs the center pivot system (which can achieve irrigation efficiency of up to 95%), while use of conventional furrow irrigation systems has nearly disappeared.

The District also provides advisory services focusing on irrigation techniques to local farmers. The District, in cooperation with the US Department of Agriculture and the Soil Conservation Service, designed a regional pre-plant soil moisture-monitoring program to provide farmers information regarding soil moisture in the root zone before irrigation seasons. It also publishes in its monthly newsletter contour maps showing the results of the pre-plant soil moisture survey each year. Another program that aims at improving the efficiency of irrigation water is the Potential Evapotranspiration Data (PET) program, in which irrigators are given computer software that enables them to track their crops irrigation using daily data. District staff visit sites on a weekly basis in order to verify the model and check moisture monitoring devices. In addition to the technical assistance programs above, the District engages in educational programs that seek to educate the public about the importance of water, and demonstrate techniques that can be used to conserve the resource.

- **Regional Water Planning Groups**

The participation of concerned water users in the decision making process of groundwater policy is widely observed and practiced as an effective vehicle to build support for, and eventual compliance with, unpopular decisions. Legislation was enacted in 1997 to promote the formation of Regional Water Planning Groups (RWPG) that consist of, among other representatives, a wide variety of water user categories. The objective of the RWPG is to prepare and submit to the state government regional water plans for their respective areas. Members of these groups are nominated by area citizens and approved by the TWDB. Each RWPG has to identify water demands for a specified 50-year period, evaluate the adequacy of existing supplies available in the planning area, determine surpluses or shortages of water supplies for the 50-year period, evaluate water management strategies, and identify cost effectiveness and environmental impacts of each alternative. They then develop the Regional Water Plan and policy recommendations, under the supervision of the TWDB. As a result of the continuous work by the RWPG, the Texas legislator passed in 2001 one of the most comprehensive water plans in the history of Texas (known as *Water for Texas—2001*).

2.4.2 Centralized Active Participation in Ground-Water Management in Arizona

In Arizona, surface water rights are based on the doctrine of prior appropriation, the principle of which is "first in time, first in right." The use of groundwater resources, on the other hand, is subject to the reasonable use doctrine in which landowners have the right to capture and use groundwater beneath their land for beneficial purposes on that land without limitations. Landowners cannot transport water off their land if the transfer injures the water supply of a neighboring landowner.

As a result of the continuous overdraft problem, the state passed the Arizona Groundwater Management Act in 1980, which created the Arizona Department of Water Resources (ADWR). It was the first comprehensive legislative framework for managing groundwater in the state. The act seeks to

reduce pumping rates to safe yield levels by the year 2025, which is a level defined by the code as the long term balance between the annual amount of groundwater withdrawals and the annual amount of natural recharge.

The 1980 Act created five Active Management Areas (AMA) in a part of the state where the magnitude of groundwater overdraft is more profound. The Act also allowed other areas to create an AMA after submitting a petition to the ADWR. The 1980 Act restricted the reasonable use doctrine and imposed strict regulations on groundwater use inside and outside AMAs. The five AMAs include over 80% of Arizona's population, and 70% of the state's overdraft problem.

The 1980 Act also provides for five management periods: 1980-1990; 1990-2000; 2000-2010; 2010-2020; and 2020-2025. For each of these periods, the director of the ADWR is required to promulgate management plans for the five management periods. These management plans require the director of the ADWR, after public hearing, to impose increasingly stringent mandatory conservation measures on all groundwater uses to meet the goals of each management period. In the event the management plans do not prove to be sufficient to meet their goals, the director is empowered to purchase and retire water rights after January of 2006. Such purchases are to be financed by withdrawal taxes on all individuals withdrawing water within an AMA.

To protect the rights of landowners who utilized groundwater before 1980, the Act provided two types of groundwater rights—irrigation grandfathered rights and non-irrigation grand fathered rights. An irrigation right is given to those who irrigated their land in any year between 1975 and 1980. In this case, each farmer is entitled to a specific amount of groundwater subject to an irrigation water duty, which is a concept that varies with the most current irrigation technologies (the TWDB reduces the water duty frequently to limit the amount of each right). A non-irrigation right is associated with land that was retired from irrigation. Holders of such rights cannot use them for irrigation purposes, but can lease them to be used on or off their property.

Moreover, the 1980 Act sets the rule for the creation of an Irrigation Non-expansion Area (INA), which can be designated by the director of the ADWR in the case of a serious overdraft problem or on the basis of an election, held by local residents of an area. In INAs, irrigated areas from groundwater resources are limited by the number of acres that were historically irrigated. Although individuals in INAs are not allowed to construct new irrigation wells, they are free to withdraw any amount of groundwater subject to the reasonable use requirement. Currently, INAs encompass over 41,000 hectares of rural areas in Arizona.

To ensure that Arizona reduces its reliance on groundwater resources, the ADWR established various programs to encourage water users to use renewable water sources, especially from the Colorado River through the Central Arizona Project (CAP). The CAP is a federal project constructed by the Bureau of Reclamation to transfer 3.45 billion cubic meters of water yearly from the Colorado River to Arizona (and other Southwestern states) using a 546 km long conveyance system.

To ensure adequate water resources for future development, the ADWR enacted the Assured Water Supply (AWS) rules. According to these rules, developers must demonstrate the availability of water for their projects for the next 100 years, of which 90% must be obtained from renewable water sources. If developers do not have access to adequate renewable water sources, they can join the Central Arizona Groundwater Replenishment District (CARWD). The CARWD uses CAP water to replenish aquifers using recharge facilities when its members use more than their allotted amounts of groundwater. In such cases, members must pay special fees.

Until 1996, Arizona did not use its full share of CAP water. Consequently, the ADWR established the Arizona Water Banking Authority (AWBA) to store Arizona's unused share of the Colorado River for future needs. Each year, the AWBA pays the delivery and storage costs to transfer Arizona's unused share of the Colorado River to different parts of the states through the CAP. The water is then stored underground through direct recharge, or used by irrigation districts instead of pumping groundwater (known as indirect recharge).

2.4.3. Centralized Management of Groundwater--The Case of New Mexico

The 1927 Legislature created the first groundwater appropriation statute in New Mexico. It gave the Office of the State Engineer (OSE--the authority that manages groundwater in New Mexico) supervision rights and control of groundwater and declared groundwater to "belong to the public, and subject to appropriation to beneficial use." The statutes also prohibit the removal of water for transportation outside New Mexico without a permit from the state. They also specify that groundwater may be appropriated outside the boundaries of declared groundwater basins for beneficial use within the state without the appropriators making application to the OSE, subject only to prior and existing rights within such areas. In areas outside declared groundwater basins, the Office of the State Engineer has no jurisdiction over groundwater use. In these areas, individuals claiming that new appropriations will impair their water rights (i.e., senior rights holders) must sue in district courts. In such actions, the burden of proof is on the senior appropriators to establish an impairment of their water right. Currently there are 33 declared groundwater basins, covering over 90% of New Mexico's total area.

In 1931, the State Legislature imposed a permit system for the appropriation of groundwater, which is still in effect. The property rights doctrine that applies in the state is the appropriation rights doctrine. In the late 1940s, the New Mexico OSE divided the state into townships. Each township is 36-square-miles of land. The groundwater in the aquifer below each township is treated as a separate source of water, even if two adjoining townships share the same aquifer. The assumption by the OSE is that under each township, there is a stock of groundwater that is different in its characteristics from the water stock below the adjoining township. This assumption was made to facilitate the calculation of the aggregate supply of water below each township, so that the OSE can determine the aggregate appropriate quantity of water. This division of the total area of the state and its groundwater resources was also essential to set rules for groundwater transfers.

Groundwater rights in the appropriation rights doctrine are exclusively owned and based on consumptive use. In New Mexico, groundwater rights were determined at 3 acre-feet of consumptive use per acre of land. The total amount of water an individual right holder may withdraw is a function of the consumptive use and the return flow coefficient, which varies with the type of use. The OSE determines both variables. The return flow coefficient equals 1/3 for irrigation and zero for industrial uses in New Mexico. The rationale behind this is that approximately 2/3 of groundwater used in irrigation either evaporates or gets absorbed by the soil and plants, thus allowing for 1/3 of the water applied to percolate back into the aquifer. In the industrial sector, groundwater used is totally absorbed and does not percolate into the aquifer after its use.

Groundwater rights holders in New Mexico have the right to reallocate the resource, granted that their action does not impair existing rights. Property rights holders may transfer groundwater from one location to another within the boundaries of a township, from a township to another, and outside the state. However, each type of transfer is subject to different policies. Any applicant who wishes to transfer groundwater rights must publish the application in a weekly newspaper for three consecutive

weeks. This gives third-parties (those who are not affected directly by the water transfer) the opportunity to voice their objections to the application, if they feel that the reallocation of groundwater will impair their rights.

Water marketing activities in New Mexico are very limited and confined to only one groundwater basin. The District's water bank is a water management tool used to distribute water from areas where it is not being used to areas in need, in an attempt to increase the marginal benefit of water. The water bank is based on allowing holders of current water rights in the District who are not using their rights to place the rights in the bank. Individuals and entities that need water can buy the right to use (i.e., borrow) water to put it to a beneficial use. When water rights holders present their rights to the water bank for deposit, they must first verify with the OSE that their rights are valid.

3

PUBLIC-PRIVATE PARTNERSHIPS IN IRRIGATION AND WATER RESOURCES MANAGEMENT: A PRELIMINARY NOTE[1]

3.1. The Challenge

MNA countries need to raise financing for annual investments in the irrigation sector between 2.5 and 3.5 billion US$ in the coming years. Government budgets will possibly be the main source of funding. But as government budgets might not be adequate, MNA countries have the option of using Public-Private Partnership (PPP) to attract additional financing. However, the only PPP options that offer financing as part of its contractual services are concession or BOT-concessions. Therefore the real challenge for the average MNA country will be to ensure a good return on irrigation projects so the private sector can commit equity and loans from commercial banks to finance irrigation projects. At the same time, available water in MNA must be managed effectively given overall water scarcity and competing claims for water. PPP can also contribute to improved management and distribution of water through irrigation networks.

To meet the challenge of financing and management, MNA governments might need to consolidate their reforms to establish an enabling environment for PPP management. Minimum features of a good enabling environment are as follows:

- ***Investment and business climate and perception of risks.*** These are determined by a series of factors such as rate of exchange policies, macroeconomic stability, sound investments and profit repatriation, and the respect to due process in the solution of conflicts at the judiciary. If the judiciary is too slow or not predictable, conflict resolution mechanisms can be part of concession contracts to mitigate perception of risks;
- ***Political commitment to expedite the formation of PPP.*** Political commitment at the highest level can be shown by hierarchy of legal instruments to put in practice a PPP contract. Committed governments use contractual instruments endorsed by law. For example, infrastructure concessions are awarded by supreme decree in Chile, with signatures of the President and Finance and Sector Ministers;

[1] This section is based on the presentation of a preliminary draft Framework Paper, *"Options and Challenges for PPP in Irrigation"*, Murcia-Spain, 2002, prepared by Sixto Requena (Consultant) and Hassan Lamrani.

- ***Clear rules for tariff making based on sound economic and financial principles.*** Rules for tariff making and adjustments should be embodied in specific laws or equivalent legal instruments, and form the basis to prepare financial projections, upon which the private sector can make qualified assessments about the convenience or inconvenience of going into a PPP;
- ***Well defined WRM institutional framework*** Clearly defined institutional responsibilities in WRM and well qualified staff in key positions will reduce the perception of risk by the private sector, as public functions related to the irrigation sector will be clear;
- ***Sound database.*** Available technical studies will allow the private sector to make all estimations needed, especially those that have financial implications and affect the profitability of the business. Therefore the more trustworthy the data, the less room for uncertainty and the more willing the private sector will be to get into PPP; and,
- ***Clear risk sharing schemes between the public and private sectors.*** Clear distribution of risks and instruments to overcome contingencies make a contract easier to agree on, given that costs and benefits of taking the risks can be incorporated in the financial analysis. In the case of irrigation projects, commercial risk will be given greater consideration given that willingness to pay by farmers can be affected by availability of water, which might be a very uncertain event.

3.2 Options and Challenges for PPP in Irrigation in the MNA Region

There are various optional contractual forms of Public-Private-Partnerships (PPP) that might be applicable to the irrigation sector. Options can be tailored for satisfying very specific irrigation needs, e.g., if there is in place a newly built irrigation system, the government might be willing to contract out management services from the private sector to ensure proper O&M and service reliability to farmers over the life of the irrigation facilities[2]. If such a system did not exist and, due to fiscal constraints, the government could not build it in the coming years, then a PPP contract can help in addressing the investment problem. The private sector could bring financing, technical and managerial expertise to build and manage the system over a number of years, long enough to recover investment costs plus a reasonable return. (See Box 3.1 for the case in the concession Embalse Illapel in Chile). However, for PPP to work to the advantage of the concerned country, it will always be very important to ensure that social and environmental issues are taken into account.

Box 3.1: Concession Embalse Illapel, Chile: a win-win-win PPP partnership

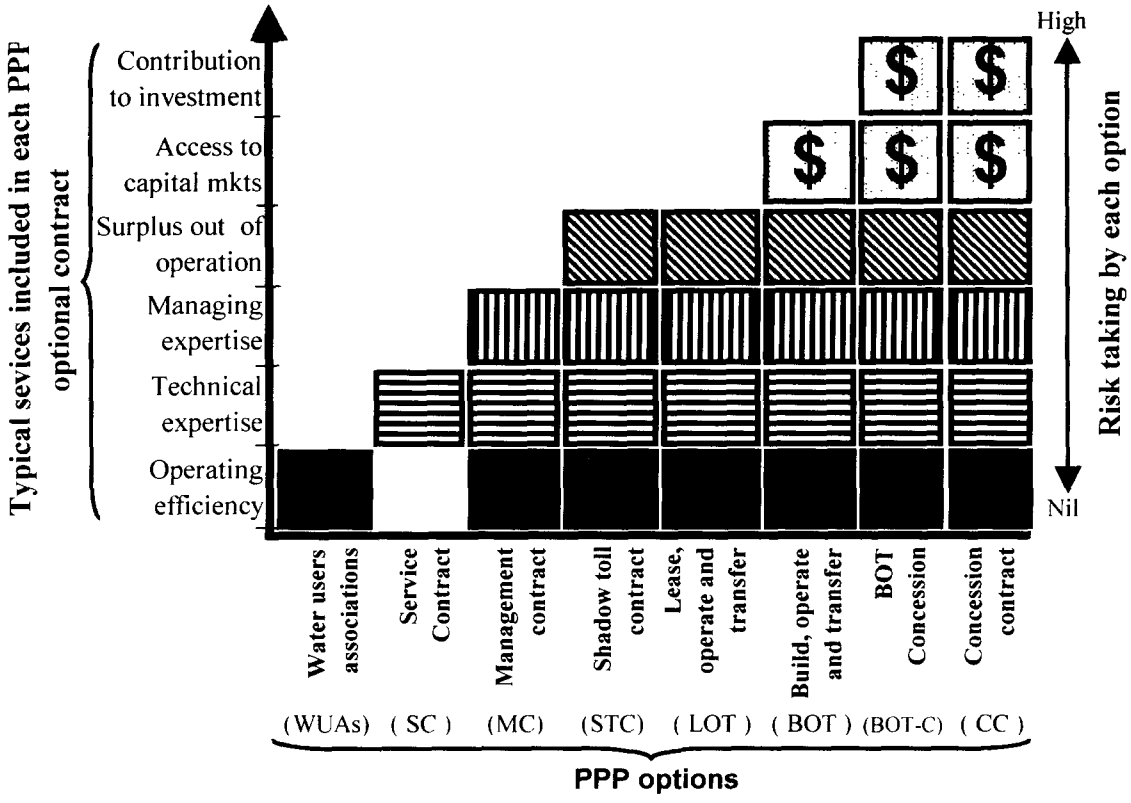
Embalse Illapel S.A. is a concessionaire undertaking a concession contract awarded in April 2001 by the Government of Chile; construction began in August 2002, and practical operation will begin by August 2004. By virtue of the concession contract:

- *The Government could win* - As Embalse Illapel S.A. will provide needed financing to build a 25 Mm3 dam and transport facilities, and to modernize the distribution network. After construction completion in August 2004 and when the dam is in operation, the government will payback 75% of capital investments in three annual installments, instead of financing 100% upfront as it was the case in all previous dams built in Chile;
- *The farmer community could win* - After finishing construction, in August 2004, they will be able to grow high value crops during the spring and summer seasons by having access to water that currently is lost to the sea. Farmers will participate in water distribution through their WUAs, paying a fee for storing water in the dam to the concessionaire; and,
- *The concessionaire could win* - After finishing operation, in August 2004 and for 25 year, the concessionaire will have the right to exploit the business, won by asking for the least capital and operational subsidy from the government. Since the contract between farmers and concessionaire are voluntary, there is a commercial risk taken by the concessionaire in exchange of which it is expected to make profits.

[2] It is widely known that without proper O&M irrigation facilities deteriorate quickly, resulting in unreliable irrigation water and in frustration for the farmers.

The options. Figure 3.1 presents a menu of eight (8) PPP contract options (horizontal axis) and six potential features or bundles of services (vertical axis, left hand side) that can or cannot be included in each optional PPP contract. Features or services offered by each optional contract are presented as separable blocks of obligations in relation to handling infrastructure for irrigation. On the right hand side of Figure 3.1, the level of risks taken by the private sector in each optional PPP contract is indicated. An idea of main features contained in each optional PPP contract can be grasped by looking at Figure 3.1; and the degrees of contract sophistication and risk taking by the private sector will depend on whether an optional PPP contract offers the possibility of improving financial surplus generation out of operations and whether or not an optional PPP contract offers the possibility of bringing cash financing up front.

Figure 3.1: Options of PPP and implied risk-taking



According to Figure 3.1, (i) WUA only offers improvements in operational efficiency; (ii) contract service offers only technical expertise; (iii) management contract offers improvements in operational efficiency, technical and managerial expertise; (iv) shadow toll contracts offer surplus generation out of operations in addition to all features offered by management contracts; (v) lease contracts offer similar services as shadow tall contracts; (vi) BOT contracts offer short term financing to facilitate construction in addition to surplus generation;

(vii) BOT Concessions offer long term financing that is applied to construction of new water for irrigation infrastructure; and, (viii) Concession contracts also offer fresh long term financing to rehabilitate existing infrastructure. And, depending on the financial engineering embodied in the contract, BOT-concessions can also offer financing for the government subsidy obligations, making it possible to build irrigation infrastructure in the immediate future rather than 7-10 years later.

According to sound integrated Water Resources Management (WRM) experience, whether we look at the Spanish hydrographic management case, the French Water Agencies case, or the Dutch Water Boards case, one lesson is very clear: decentralized "corporate like" principles can be applied for implementing WRM functions. Using these principles, interests of various relevant stakeholders can be represented and independent professional management of day-to-day WRM activities with full financial and administrative autonomy can be achieved. Once decentralized, and financial and administrative autonomy for WRM is achieved, authorities in charge can work with a budget financed by water taxes, out of which they can direct grants to various stakeholders to promote proper handling of water aimed at implementing: (i) on farm water saving techniques; (ii) improved dam and distribution systems O&M, through choosing the best contractual instrument; (iii) improved domestic and industrial sewage treatment; and (iv) assess benefits and costs of PPP contracts and support them when they are found to be the best instrument to improve WRM objectives.

3.3 Pilot Projects

The pilot projects for private sector participation in the Guerdane irrigation district and the Gharb region in Morocco are a case in point. As part of its program of economic reforms, the Government of Morocco has decided to implement two projects for rural water conveyance and distribution through PPPs:

- The Guerdane Project in the Guerdane perimeter, near Agadir; and
- The Gharb Project in the Central Zone of the Gharb region, near Kenitra.

The Guerdane project will serve a population of market-oriented farmers in a perimeter of 10,000 hectares. It is now at the stage of pre-qualification of interested investors. Opening of biddings is expected to take place in January 2003. The Gharb Project will be tendered at a later stage.

The Guerdane project, for which total investments are estimated at US$80 million, has two main components:

- Construction and operation of a 70 kilometer-long, gravity-based (buried pipes) water conduction infrastructure that will convey an annual volume of 45 million cubic meters from the Chakoukane-Aoulouz complex to the Guerdane perimeter; and
- Construction and operation of an estimated 300 kilometer-long irrigation network that will distribute irrigation water to farmers within the Guerdane perimeter who express their demand. Distribution of irrigation water through the distribution network up to farmers' individual storage basins will not use electric power.

Designing the appropriate tariff structure is a key aspect of the PPP activity to ensure the financial viability of the project for prospective investors, and to induce farmers on the perimeter to use surface water efficiently. It will also be used to finance a process of further technical innovation to save water by the farmer community so the critical limited resource such as surface water is used diligently, and waste is prevented.

3.4. Conclusion

In the context of the need for additional financing and improved management, the experience to date in MNA countries is more with water user associations than with private

commercial sector participation in irrigation. User associations have largely participated in irrigation O&M and improved management of water services. A clear choice for MNA countries, therefore, is to clearly identify the potential roles of the private sector in water management and development, together with risks and incentives.

Analysis of PPP options must address concerns about the social and environmental impacts Questions to address include: (i) Does PPP improve service delivery to small holders and tail enders? (ii) Does PPP for market-oriented agriculture permit the government to focus on public good services to the poor? (iii) Will tariff increases be politically acceptable? and (iv) Will environmental conditions worsen under PPP?

4

GROUP DISCUSSIONS

Group discussions during the regional consultation addressed the main issues raised by case studies and the field visit. Cases were discussed in light of the different participant country experiences. Discussions focused on the main policy concerns and main implementation challenges that are often encountered. Particular attention was paid to the issues of participatory management and the specific role of private participation in irrigation vis-à-vis the public authorities.

4.1 Group Discussions on Groundwater and Aquifer Management

The key questions discussed in relation to groundwater and aquifer management were:

1. What are the enabling pre-conditions (context/legal/institutional) for Participatory Groundwater Management?
2. What are the roles of key players (Basin administration, national/state governments, water users associations)?
3. What would be the implementation challenge for groundwater management (monitoring wells and abstraction/regulation enforcement and policing)?
4. What are possible solutions: economic tools, social mechanisms or other?

Enabling Pre-Conditions

Country participants agreed that participatory aquifer management seems often to be a response to a crisis that triggers the need for action. The types of crisis discussed that affect MNA countries may include water scarcity (as a result of refugees influx, for example), water quality, and transboundary issues. But there are other more common situations such as increased demand relative to water availability, gradual depletion and degradation, population growth and poor efficiency in management. Any of these may trigger the need for an alternate approach in groundwater management. An indication as to when a problem situation reaches a crisis level (see Barcelona case) might lie in the need to communicate the sense of urgency, involving data collection and documenting the problem, to the users and decision makers.

Enabling preconditions for sustainable aquifer management, in general, and according to the case studies may include the need for the development of a legislative framework for aquifer management, strengthening in parallel institutional capacity and separating the ownership of wells and the ownership of water (that participants argued needed to remain public), and moreover, integrating surface and groundwater management.

Participants argued that one key aspect in groundwater management is the definition of the goals of sustainable aquifer management. This could be defined as the preservation of water availability and sustainability (in quantity and quality), the improvement of service quality, the development of knowledge, studies and monitoring, etc. However, improving implementation requires getting users involved in formulation/design of general goals and in the management system (see Barcelona and Mula). Participants also considered that increasing implementation success requires developing a legislative/institutional framework and water rights system which takes into consideration the internal variation in different parts of the various countries (see Jordan, Arizona, New Mexico, Texas)

An adequate definition of water rights as an enabling pre-condition for aquifer management was discussed in the context of considering water as a public property. Country participants argued that this is important because it insures taking care of equity issues. It was acknowledged, however, that some types of private rights of use may be adequate and serve as incentives for the preservation of resources. The identification of groundwater private rights was considered important when there has not been public property involved but simply appropriation. Some participants argued that in the definition of water rights it would be important to consider issues such as the priority that needs to be given to drinking water supplies, that water might be in some cases strategic for production and that it might be necessary to save water for future generations. Other considerations included the need today for allocating water to high value uses.

The Role of Different Actors

Some of the participants argued strongly that in policy implementation and in the promotion of participatory aquifer management, it is important to consider the different roles of various actors in order to protect the public's interests, consider the equity issues and the needs of future generations, and insure improved water use efficiency and allocation. It became clear that there was a consensus among participants that all national governments, Basin Authorities and users associations have an important but different role to play.

The roles for national governments discussed in light of experience included strategic planning, development of legislation, establishment of financing policy, setting priorities, defining the role of other levels of management, implementing policies for decentralization and acting as regulator. Many argued that Government should have control of water resources, and should be able to conduct assessments and other research, take a lead in education, and carry out major investments where needed. However, Governments should also establish economic policies to ensure rational use, use subsidies whenever appropriate, and ensure that monopoly situations (when there is private involvement) do not create allocation inequities and unreasonable profits. However, some of these responsibilities may be shared with the Basin Authorities.

Basin authorities were also seen to have an important role to play as the main body for integrated resources management at the basin level. They could play a role as regulators and in enforcing legislation and at operational level of the basin, acting as the main liaison between users and government. Basin authorities are essential in this interface role and in the support and creation of relationships with users, including the creation of users associations. Users associations, in fact, as shown in the case

studies, frequently depend on them for support in enforcing rules and carrying out studies.

Participants discussed how, in light of the cases presented, Water Users Associations should have an essential role in aquifer management. They are envisaged as having mainly an operational role, but should also participate in the decision making of the basin authorities. Some participants, however, showed concern over the issue of user participation in management and the problems that may be encountered. Some posed the question of whether there was a need for users associations focusing on water management or whether the government is better positioned to carry out operational water management duties.

Discussions by participants pointed out that the experiences presented through the case studies seemed to show that aquifer level user associations with the support of Basin Authority might be particularly effective in establishing agreements among users for water abstraction and distribution, monitoring individual members' water use, and enforcing agreements and fines. What also emerged, however, was how important it is for Water Users Associations to act in the framework of the legislation and regulations established at basin and national levels, defining their responsibilities and their instruments for action.

The Implementation Challenge

Implementation of changes in aquifer management can be problematic. Some of the problems faced by public organizations were raised by participants and often relate to enforcement and control. Public actions pose problems in relation to monitoring wells, controlling volumes abstracted, and enforcing and policing regulations. Still, it was recognized that there needs to be an important level of public control (versus individually owned and managed wells).

Participants argued that there are advantages to public intervention such as financial resources, legislative instruments and heightened capacity, but also some disadvantages such as slow action and increased bureaucracy. Government management might be easier where there are less wells and users (Jordan experience) but more difficult where there are a multitude of users and wells (Spain). The latter may require more decentralized systems of management and greater user participation when even RBA are unable to control all abstractions and other incidents.

There was a general recognition that enforcement of new laws takes time and it is important to balance the use of education versus the use of policing, inspection and mandatory instruments. In this context it is important that users are present to deal with the implementation challenge and they also should be proactive in demanding collaboration from basin authorities and efficient government (Barcelona case).

Some participants pointed to the importance of measures for monitoring and control of water quality and water quantity in aquifer management. Making implementation successful, however, could rely on options such as a mandatory metering policy but with a grace period, dealing with illegal water use by establishing a police force, and giving appropriate powers to implementation agencies. The power of demonstration actions such as closing key wells and prosecuting people (Jordan experience) could ease implementation. These enforcement measures require that there exist the political will to support these actions.

Actions for Improving Aquifer Management

Two types of actions were discussed in light of the cases and experiences that were analyzed earlier. Some were technical solutions and others were socio-economic measures. Some participants argued that in analyzing actions and options it was important to draw on the lessons

of the cases discussed and other country experiences that showed that improving aquifer management requires considering also surface water, treated wastewater, and brackish water.

Discussions centered on some technical solutions such as artificial recharge, conjunctive use of surface and groundwater, desalination of brackish water and its viability, in addition to regulatory/mandatory actions, economic tools and social mechanisms. Actions proposed were: closing wells; grouping wells to facilitate monitoring; using land use policies and controlling new land uses to avoid further pressures; establishing a system of fines and penalties; establishing users' fees (increasing block tariffs); and changing from direct to indirect subsidies. Some participants argued that the use of water for higher added value uses might be facilitated by establishing incentives/subsidies to favor low-water-use in agriculture. Other actions to facilitate this could include buying agricultural non-used water to use it for municipal use and for compensating farmers for not irrigating. Some participants raised the issue that the establishment of water banks as an option may present obstacles, particularly if, as in many parts of the MNA region, there is no real water surplus and no tradition of having the right to sell water.

Participants considered that community management tools and peer pressure was as important as insuring users collaboration with authorities in policing. To be effective the establishment and implementation of laws & regulations require the consensus of all the actors.

4.2 Group Discussion on Public-Private Partnerships in Irrigation and Water Resources Management

The key questions discussed in relation to public private partnerships were:

- What is the possible role and areas for PPP implementation?
- What are the obstacles and incentives for PPP?

Some participants argued that public management might be projected by some in a rather negative light (hence proposals for increased private role). The participants pointed out the importance of considering conflicts between public and private interests, for instance, the private sector may want to expand use when the common interest is to control this.

Overall, it was agreed that private sector involvement might need to be seen as an instrument of achieving public goals and not the other way around. The government has to have a strategic plan of action and consider how the private sector might contribute to the plan.

The cases presented showed that it is important to ensure that all participants are winners, and to find win-win-win strategies. But participants argued that this may not always be possible when you have to care for public interests, and that there needs to be a way of balancing public and private interests.

In order to deal with the obstacles and incentives for the development of public private partnerships, some participants argued that it is important to define the role of the private sector mainly as an operator of services of water supply, in charge of distribution. Private operators could also deal with water development and main conveyance systems, although this might be more complex and difficult, given the strategic nature of water resources management.

On the basis of participant country experiences with PPP, it was argued that it is fundamental to have a clear legal and regulatory framework, capacity to regulate private operations and well-defined responsibilities, rights and obligations. Transparency is also very important in any process of private involvement in water resources management. Good market conditions are necessary for private participation to be viable and to be able to sustain itself. Some

participants agreed that this might be facilitated by providing incentives in the form of well-aimed subsidies to make "business" viable in irrigation areas. Still, viability of private participation in irrigation areas is linked to the existence of high value added crops and the implementation of soft loans to improve technology. However, it was discussed that a major obstacle for producing crops with higher value added is the nature of land tenure system and smallholdings. An additional issue raised by some participants was that it is also important to take into account that the viability of private sector involvement could be linked to "collateral" businesses of the main public services, such as maintenance and agricultural processing where relevant.

5

COUNTRY CONSULTATION FOR THE THIRD WORLD WATER FORUM, JAPAN, MARCH 2003

The last session of the Regional Consultation focused on the preparation for the Third World Water Forum (3WWF). The main objective of the discussion was to collect the key MNA messages to be conveyed to the 3WWF and discuss the format of the MNA session at the 3WWF. Mr. Kenzo Hiroki, from the 3WWF Secretariat, briefed the delegates on the organization and structure of the 3WWF, including the importance of the Regional Day as a vehicle for attracting the world's attention to water challenges of the MNA Region. The objective of the Regional Day is three-fold: (i) review common water issues and strategies in the region on prioritized themes based on various studies, virtual conferences, water voices, etc. organized during 2002-2003; (ii) establish a mechanism to share information and knowledge among the countries and partners active in the region, and coordinate various programs to increase their impacts; and (iii) prepare a Regional Statement to be submitted to the Ministerial Conference at the Forum and to present regional issues to the world and donor communities. The preparation of the Statement will be facilitated by the core organizers and agreed with the country delegates and partners at the plenary session of the Regional Day.

Different activities that have been undertaken by the Partnership Program in assisting countries of the Region to prepare for the Forum, such as the Water Voices Project or the Virtual Conferences were also presented to the country delegates.

The Regional Consultation led to the agreement on core themes to be presented and discussed at the 3WWF: (i) Sustainable Groundwater and Aquifer Management, (ii) Public-Private Partnerships in Irrigated Agriculture and Water Resources Management, (iii) Agriculture Policy, Water, and Food Security (iv) Treated Wastewater Reuse, and (v) Desalination. Some of these topics have already been the subject of specific regional workshops (e.g., Groundwater Management Workshop, Amman, 2000 and Wastewater Reuse Workshop, Cairo, 2001) and reports on the first three themes are currently underway.

Participants considered that the dissemination of key lessons learned from the various cases is important for progressing in the topics above. It is essential to reiterate the need to share with

other countries information and experiences on water resources management.

Participants' countries discussed some organizational issues and in-country preparatory process leading to the 3rd World Water Forum. It was suggested that countries would include actions such as briefing Ministries on the importance of the 3rd World Water Forum and would seek to organize working groups responsible for informing and raising awareness about the Forum among other stakeholders.

It was also suggested to involve, in the preparation and coordination process, the sub-regional organizations. For example, Arab Maghreb Union (AMU) has conducted several water-related studies, over the past years, focusing on coordination of water policies and the political economy of water and could be useful in presenting a broad picture of the water resources situation in North Africa at the Forum.

The Regional Day could include the MNA Region and all the remaining Mediterranean countries (Spain proposal), on the basis that water problems encountered by Mediterranean countries were similar to those experienced by Middle Eastern and North African countries and different from those experienced by European countries. This proposal, however, would have to take into account other Regional Days arrangements and be reviewed by the 3WWF Secretariat.

Opportunities for joint presentations during the Regional Day with other organizations, such as IDB, which has submitted a request to the 3WWF Secretariat to organize a session on the use of saline water and treated wastewater for irrigated agriculture convened by the International Center for Biosaline Agriculture (ICBA), were also considered. The World Bank welcomed this prospect and suggested combining the ICBA-convened session and its own session on wastewater reuse, including desalination. It was agreed that this option would be further explored over the coming months.

A timetable was developed and included a list of tasks to be accomplished by both countries and partners until the next consultation and eventually until the 3rd World Water Forum. It was agreed that the next consultation will be held sometime in October 2002 and that the Bank would advise the countries and other partners on the date and venue of the next 3WWF Regional Consultation.

More specifically, from June until the next consultation, the country delegates agreed to hold stakeholders consultations for 3WWF preparation, participate in 3WWF-led virtual conferences to share knowledge and information on key water management issues and provide feedback on the on-going thematic reports prepared by the World Bank. Countries will also start reflecting upon the selection of their delegation to the Forum and preparation of the Regional Statement throughout the period leading up to the Forum in March 2003.

As for the Partner organizations, including the World Bank, they have agreed to work together for preparation towards the Regional Day to maximize synergies and provide support to the countries for preparation of the Regional Statement. Finally, the World Bank, along with the other partner organizations will encourage regional knowledge sharing through Internet dialogue, newsletters, and an email distribution list, and will organize and support regional consultations with countries until the 3rd World Water Forum.

6

KEY LESSONS DRAWN FROM THE CASE STUDIES

The main lessons from the cases and other discussions leading to the 3rd World Water Forum are presented below.

6.1 Options for Improved Water Resources Management and Applicability in MNA Countries

The presentations and discussions on the two main themes in the Regional Consultation meeting (groundwater and aquifer management and PPP in irrigation) have shed light on some key issues, especially in relation to water rights, institutional arrangements, economic measures, and also about the challenges involved in the process of implementation of policy changes and public private partnership.

Groundwater Rights

Property rights of groundwater can be vested with the government (public property rights doctrine) or with individuals (private property doctrine). In the public property rights doctrine, ownership and control over use rests in the hands of the government. Individuals have the right to use groundwater only with permissions from the government. In the private property doctrine, owners of groundwater rights can make decisions and investments to maximize private returns from using the resource.

Faced with critical aquifer depletion, some countries took dramatic steps, by changing the ownership of groundwater from the private hand to the public hand. In Arizona, strict regulations were introduced for Active Management Areas (AMAs) to set clear limitations on abstraction volume, while the remaining areas including Irrigation Non-expansion Areas (INAs) were kept with private property doctrine. Likewise in Spain, the 1985 Water Act declared that groundwater is under the public domain, but the transition from private property to public property has not been smooth, in spite of some transitory procedures. Needless to say, there are inherent difficulties in the registration of more than 1 million wells.

Well-defined property rights provide clear interpretation of each user's rights and duties and facilitate reallocation of water for higher economic uses. In New Mexico, groundwater right holders have the right to use 3 acre-feet of consumptive water per acre of land. Individual right holders can transfer water rights to others within the state if it does not cause negative impacts on third parties.

On the other hand, the Arizona Water Act banned the transportation of groundwater to AMAs from any other area outside. Large cities, such as Phoenix, purchased farming areas called "water farms" in various rural counties for withdrawing water to meet increasing water demands. The ownership of these farms exchanged hands from the private sector (individual farmers) to the public sector (cities). Since cities are public entities, they were not required to pay property taxes to the counties in which water farms were located. As a result, those rural counties lost a considerable amount of tax base (which used to be paid by private owners), and lost some of their revenues necessary for local development projects. In addition to these apparent financial losses, farmers in the water-exporting counties experienced a considerable decline in their water table. This is because the water code did not clearly define the maximum groundwater withdrawal amount from areas outside AMAs. As a result, tremendous amount of groundwater was transported from water farms into AMAs, which caused the decline in the amount of groundwater available for local farmers.

The rapid drawdown of aquifer could have been minimized, had water rights been clearly defined in those rural counties. These inconsistencies seem to suggest that the complexities associated with water transfer will continue, even if economic forces of water utilization are considered.

Finally, it should be noted that perfection is the enemy of the better when it comes to water law legislation. Both Arizona and Spain amended water laws more than three times in the last two decades. The 1980 Arizona water act was amended in 1991, 1993, 1995, and 1997. Still, they are facing paramount challenges that necessitate further amendments in their water policies. Seeking an appropriate framework of groundwater management is a lengthy process for governments and user groups, particularly in cases involving fundamental paradigm shifts of water rights, but what is important is to take the first step.

Institutional Arrangements

Approach from the Top

The Ministry of Water and Irrigation of Jordan has successfully introduced a series of groundwater conservation measures that include registration, metering, and volumetric charges even in the case of irrigation water. The government's efforts should be highly praised for controlling all sectoral uses in a comprehensive and consistent manner. It should be noted, however, that this approach was made possible under specific circumstances, such as the government's strong enforcement capacity (which is rare in many developing countries) and the relatively small number of wells within easily accessible range of government offices.

In New Mexico, the 1927 legislature provided the Office of the State Engineer (OSE) with supervision and control of groundwater, declaring that groundwater belongs to the public and is subject to appropriation to beneficial use. The OSE fulfills its responsibilities without particular participation from users. Although some participatory approach has been introduced in preparing a long-term management plan, the state government is solely responsible for water right appropriation, which is supplemented by legal courts' adjudication processes. This centralized system requires a great deal of government's capacity and budget to manage time-consuming administrative work, such as confirmation processes of water rights.

In Arizona, a comprehensive and stringent regulatory framework has been introduced, including various types of management tools, such as the designation of AMAs and INAs, Grand fathered rights, Type I and II rights, Central Arizona Groundwater Replenishment District (CAGRD), Assured Water Supply (AWS) for new developers, etc. The Arizona Department of Water Resources (ADWR) plays a central role in planning, supervising, and policing water rights in AMAs and INAs, in coordination with other government agencies without active interaction with users

organizations. This centralized system requires many competent professional staff and a considerable budget, similar to the New Mexico case. It should be noted that the 1980 Groundwater Management Act, which requires developers to establish AWS for the next 100 years by using more renewable sources, is a useful tool for controlling water demands under severely constrained aquifer conditions. However, requiring only the municipal sector to provide an AWS may be detrimental to the other sectors of the economy, namely the industrial and the manufacturing sectors. Requiring an assurance of water availability should be equally distributed among all water users.

Bottom-Up Approach

In Texas, Groundwater Conservation Districts play a central role in groundwater management, from permitting well-drilling to monitoring aquifer conditions, while the state water authorities provide only limited guidelines and restrictions as well as state-wide long-term management plans. The districts are governed by a locally elected board of directors and operated by staff hired to conduct specific tasks. Their operations are often supported by a combination of user fees or local taxes depending on the district. Because the districts are local entities, they are able to develop water management approaches including regulations tailored to match management needs within their area. In addition, they are able to build support for management policies because the districts are governed by the very users that are affected by water problems.

The state government proposes the establishment of groundwater conservation districts for critical aquifer areas, but has to be approved by referendum. Some cases were supported and others were rejected depending on the public vote. Also, any changes to policies and programs that groundwater conservation districts embark on must be first discussed and approved by the tax payers and the general public. Proposed policies can become binding policies only with public approval. Because of the nature of this process, the primary activities of the districts are to encourage water conservation rather than to enforce regulation.

This arrangement has given a great deal of credibility to the districts and increased the awareness of water issues among the public. The residents of these areas compared a self-management scheme with a more centralized approach and they chose the former. Besides, some incentive programs, such as low-interest loans for advanced irrigation systems, gave the incentive to local citizens to either form a new district or join an existing one.

This approach may hold a promising idea in a very decentralized society, such as Yemen. An incentive package including well-targeted subsidies and low interest loans for advanced irrigation systems along with a set of pumping regulations set under specific aquifer management goals can be presented to the population for voting. Through this process, water challenges and possible policy options can be understood more clearly by the stakeholders and could be accepted with strong ownership of the management package.

Combined Bottom-Up and Top-Down Approach

Successful groundwater management has been achieved through the combination of government regulation and participation from Users Associations as seen in Spain, France, and some states in the southwestern region of the U.S. Particularly in Spain, the partnership between river basin authorities and users associations has been formally established by the 1985 Water Act.

In Spain, river basin authorities (hydrological confederations) under the auspices of the national government manage both surface and groundwater within the hydrological basins. The Basin Authorities are supported by competent staff and adequate budget. The Basin Authorities are required to identify over-

exploited aquifers and ensure that water users associations are made responsible for sharing management responsibilities in these aquifers. It also stipulated in the 1985 Water Act that River Basin Authorities and user associations can establish formal collaboration agreements in water resources management and control of wells and their legal rights. In this case, the basin authorities can provide technical and financial assistance for user associations to fulfill these expanded roles.

In Barcelona, the partnerships between River Basin Authorities and Users Associations have been remarkably successful. The users associations, which have an independent legal status allowing it to enforce the decisions of the Board, committed to establishing sustainable aquifer use and raising public awareness about the value and importance of protecting groundwater. They were able to register all groundwater users in the official "Water Registry" and prepare a full inventory of existing wells. They collaborated with the Catalan River Basin Authority for various activities including publication of opinion articles in major newspapers to inform and seek support of the general public. These efforts have greatly contributed to turning around the trend of aquifer depletion.

In Mula County, Spain, user associations played a key role in transforming old and deteriorating irrigation facilities on the brink of land abandonment into a modern micro-irrigation network with a computerized automation system. The design and operational practices, which were consistent with the local crop requirements and farmers capacities, were decided by the users associations in a participatory manner.

In the US, there are different types of management styles, ranging from centralized (as in the case of New Mexico) to decentralized (as in the case of Texas). There is, however, a general trend in many Southwestern states to use a moderate approach, which combines the elements of both the centralized and the decentralized management options.

In New Mexico, the OSE still holds most of the regulatory functions, but the public started becoming more involved in designing groundwater management policies. In 1987, the Authority decided that regional water planning should be prepared with the participation of a broad range of stakeholders. Also, in Texas, frequent droughts and rapid economic growth have promoted a more comprehensive planning doctrine to ensure that all groundwater basins are represented. The general public is becoming more involved in designing state water plans. In 1997, the new legislation directed the TWDB to designate 16 Regional Water Planning Groups (RWPG), which include various interest groups ranging from irrigators to utility companies.

Economic Measures

An effective tool to facilitate groundwater conservation is metering abstractions and imposing fees based on the volume of water abstraction. As seen before, these economic tools are being successfully introduced in Jordan. First, metering and pricing was applied to all extracted groundwater except for those used for irrigation, saving around 10% of the total used amount in industry due to the induced recycling of water. The price of water was set at US$ 0.37 /m3 in 1999. Afterwards, metering was also introduced for irrigation use to check the amount of abstraction against the threshold set in the permits. Now, the MWI has worked out with the farmers' representatives a block type of tariffs on irrigation water even within the limits of the granted water rights.

In Mula, Spain, both water demand and existing supplies are integrated into an intelligent system in which there is a detailed account of available water reserves, individual consumption, financial costs and power consumption according to the sources of water. The Cooperative draws from a combination of sources: regulated water from the Segura River, which is the cheapest because it is delivered by

gravity and cost them 0.03 Euro/m^3; water from the water transfer Tajus Segura which is more expensive (0.13 Euros/m^3) since it incorporates the payment of an expensive transfer infrastructure; and groundwater when other sources are insufficient.

Those water prices are determined by the costs of the combination of available sources depending on the time and scarcity from the cheapest to the more expensive water supplies as additional volumes are requested by users. Farmers are charged different prices according to volume and time of use. Since farmers understand that more volume of water use above a threshold implies accessing more expensive sources of water, only those who are willing to pay higher prices will use more water. This is a good example of how water scarcity signals are incorporated into pricing depending on the timing and volume.

Implementation Lessons

We can draw lessons from the four cases presented in relation to implementation of participatory groundwater management, modernization of irrigation systems and government efforts in policy reforms. These include:

The importance of the trigger for organized action. The cases of Barcelona and Mula show that there is a difference between the existence of a problem, the perception of the existence of a problem by some major groundwater users (those most affected) and the perception of this becoming a common problem that requires joint action. The local authorities and local groups have a fundamental role to play in this process.

Managing groundwater is about dealing with people: people's interests, people's traditions and people's awareness of problems and consequences. Dealing with the problems of changing from an existing regime of groundwater management is a stepwise process. In Jordan, in Barcelona and in Mula, the consideration and respect for people's prior abstraction rights, the difficulties of improving existing farming and industrial practices and the promotion of awareness of problems that require going beyond an individual approach, needed to be addressed explicitly and gradually. In Jordan giving time to adapt to new legislation, new controls, new charges (first industry and later, irrigation) was key to implementation success. In Barcelona and in Mula the most difficult challenge was to change people's minds and this requires a constant process of "going public."

It is also about people because groundwater management is facilitated by putting differential users' capacities to work. Groundwater management is complex, but different users/actors have differential skills. The lessons from Barcelona and Mula show how counting and using existing skills and experience of the different users can facilitate aquifer management. The collaboration of the River Basin Authority (RBA) for monitoring and studies and providing support for enforcement is fundamental. The experience of Jordan shows that building capacity and skills in central government can have important direct results in implementation.

Aquifer management does not have to be "expensive." In the cases of Mula and Barcelona, joint management has been done mainly on a volunteer basis. It is only administrative and operations staff that is needed. The provision of differential skills and services by members can also make a cost difference and save to have to contract out services such as monitoring, aquifer recharge, policing, etc. In Texas, financing groundwater districts costs property owners a very small amount of money (US$0.0083 per $100 valuation).

Using existing sectoral coordination mechanisms is important. Often threats and potential for improvement of groundwater resources are not only due to existing uses but related to expectations and plans of other actors. In the protection of groundwater resources, the case of

Barcelona showed how important it is for water managers to influence strategic plans through public participation processes. This includes major land use plans, metropolitan infrastructures, and port infrastructures that in the case of Barcelona could endanger the aquifer of the Baix Llobregat.

The challenge of adopting solutions tailored to existing capacities. In groundwater management there are complex issues of monitoring, control, organization and joint action. For example, early monitoring is important. The experience of Barcelona showed that this could start with local participants and the support of the River Basin Authority.

The importance of demonstrative actions and clear political will. In Jordan this has been fundamental for policy implementation success when dealing with illegal wells as when a situation affects both big and small farmers. Consistency and transparency with no double standards seem key to implementation success.

The importance of a clear legislative framework. In critical scarcity situations the existence of an appropriate legal framework with clear enforcement powers to the water authorities (and water users associations) is fundamental. This is a fundamental implementation lesson from the cases of Southwestern U.S. and Jordan. In Jordan the laws of the Ministry of Water and Irrigation have been modified and approved by the power of the court. With this the Water Authority of Jordan can take immediate actions (i.e., illegal wells, pricing) without waiting for permission. In the US, the degree of water scarcity drives the amount of legislation and regulation needed to design an optimal management scheme. Texas faces less water scarcity than Arizona and, thus, has less regulations and limitations on water use.

Improving aquifer management is a long process. At the same time, it is important to demonstrate benefits gradually to maintain success of actions. In Barcelona, the improvements of both the conditions of the aquifers and aquifer management have been slow and is still problematic. Improvements in water use in irrigation in Mula have also been slow. Increasingly tough and difficult actions have been taken. First there were small controls and dams, voluntary reduction of abstractions, and improvements through technology changes. As benefits from organized action have showed, it was possible to implement other actions such as banning abstractions, strict systems of quotas and enforcement of penalties for irrigation outside of perimeters, etc. The advantage of users' participation is that benefits are sustained by users themselves.

The power of piloting and demonstration. The cases of Barcelona and Mula show the power of pilot and demonstrative actions for changing legislative frameworks for groundwater management and influencing national and water agricultural policies.

Other important implementation issues that were mentioned in the different discussion sessions include the power of trust and perception of common interest; the need to balance costs to improve aquifer management and perceived interventions; the importance of leadership; and the need to support Participatory Management by the national and river basin organizations.

6.2 Implementation of Public Private Partnerships, Roles, and Risks

Water Resource Management (WRM) in the MNA region, as in other regions, is concerned with the conservation and overall allocation of water to various competing uses, including water for irrigation, domestic, industrial, and environmental consumption. The trigger for involving the private sector in irrigation could be, as in Morocco, related to the increasing pressures on scarce budget resources or the search for alternative solutions for increasing efficiency in the management of the system.

The strategic aspects of water management are clearly the responsibility of the public sector. The public sector is the strategic planner, the

policy maker, and the rule maker. There are, however, some aspects on resource management that could benefit from the involvement of the private sector. From practical experiences, as in the case of Murcia, we know that there are various segments integrated vertically in water resource management. It is important to identify what the government can do in each of the segments.

Worldwide, management of irrigation is beginning to be handled at a much lower level, as in the case of Mula. In this context, a range of institutional instruments such as water user associations and the private sector are being considered and promoted for improved management and financial sustainability.

However, there are many concerns related to private sector participation; potential monopoly power of the private sector is a concern. Equity and environmental effects are other concerns. There are also a number of risks to be considered in the case of private sector involvement. These risks include business climate, political commitment, profitability, and legal and institutional frameworks. Commercial and market risks are also a consideration. The distribution of risks also has to be well established. Without the government accepting a part of the risk, there will be no incentives for private capital to engage in projects. On the other hand, a totally risk averse private sector would not be a lasting partner.

Policymakers' objective should be for everybody to benefit from the right policies, including the local governments, public and private sector, and the water users. Governmental regulation is therefore central to PPP arrangements.

7

THE WAY FORWARD TO THE THIRD WORLD WATER FORUM (3WWF)

The issues and challenges in the MNA Region have been identified and discussed by a series of RWI conferences and workshops that have been organized since 1998. Also, at the global level, water resources management policies and strategies have been discussed and understood at the 2nd World Water Forum in Hague in 2000, which produced the World Water Vision Report, and the World Summit in Johannesburg in August-September, 2002. Thanks to these efforts, key policy and decision makers have shared the issues, strategies, and understanding of the necessity to initiate water sector reform to some extent although more strenuous efforts need to be made at basin and village levels to have all layers of stakeholders share the concerns and issues with the policy makers.

The main theme of the Third World Water Forum (3WWF) is "From Vision to Action." However, many governments still do not have adequate information and knowledge regarding how to transform the concepts of integrated water resources management to actions on the ground adapting to various local conditions. Specific tools and instruments are still not available for filling this gap even though numerous generic policy papers have been prepared. It is time to re-focus our technical assistance from policy and conceptual dialogue to provision of instrumentation tools. The countries of the Middle East and the Mediterranean Region, including North Africa, share similar types of climate conditions and water challenges. Relevant and useful lessons can be analyzed and shared for these countries drawing on the experiences region-wide and worldwide, which would give direct support for the institutional reform of those countries.

To help countries tackle the implementation challenges, the World Bank and other international communities can help in the following areas:

1. Providing lessons and experiences from relevant cases. Analytical reports focused on implementation can be prepared drawing on global and regional experiences, including the Mediterranean Region.

2. Discussing the analytical results and cases at regional workshops coupled with field visits as well as through other communication means.

3. Conducting pilot projects on the ground reflecting the lessons learned under the actual investment projects among countries and donors.

These kinds of activities will greatly help the countries transform the ideas and concepts into practice, enabling them to reform the legal and institutional framework.

The Kyoto Forum offers a stage for preparing a concrete action plan at the regional level to move forward with the above three activities for assisting countries in their water sector reform efforts. The regional statement to be submitted to the Forum Ministerial Conference can include this kind of a concrete action plan with the ownership of the countries along with the support from the international donors' community. We would also like to discuss how we could measure and secure the benefits from this action plan and achieve the targets with a clear timeframe.

The groundwater and aquifer management study introduced in this report is our first effort along this idea evolving from the discussion of conceptual policies to provision of implementation tools. We have found that there are no perfect practices of aquifer management but there are some relevant case studies in terms of joint management between the basin management authorities and water users associations, economic tools, water right system, etc., which can provide useful lessons for the MNA countries. Many participants at the Consultation in Spain welcomed the idea and interesting cases introduced during the presentation and field trips.

The remaining key themes, such as agriculture policy, food security, and water as well as desalination options based on country reports and other analytical papers, which will also be presented at the Kyoto Forum, will be discussed at the 2nd Regional Consultation meeting. Along with these studies, groundwater and aquifer study will also be enhanced responding to the countries' expectations and emerging challenges in the region, such as the management of fossil and trans-boundary aquifers towards the future.

Information dissemination is also crucial in making the best use of the knowledge generated. The workshop in Sana'a in 2000 and the Regional Consultation in Spain (2002) were useful for discussing real cases in combination with well-programmed field trips. Other communication means, such as videoconferences, virtual Internet discussions, the RWI website, and newsletters have been used and will be further explored for more effective communication among the countries and donor communities.

Partnership and donor coordination is also critically important to enhance synergies and avoid duplication among the donors. The Regional Day formulation towards the Kyoto Forum provides us with an ideal opportunity to work together through preparatory regional consultation and other consultations and to ensure coordination among the programs organized by different institutions. The partnership also aims to build a coalition with the initiatives by the countries and regional institutions and foundations.

The 3rd World Water Forum, particularly the Middle East and Mediterranean Regional Day, offers a stage to highlight the MNA water issues and engage major partners, such as IDB, UNDP, GWP, and other key international and bi-lateral organizations.

Following the First Regional Consultation in Spain, the following steps will be taken towards Kyoto:

1. Prepare a briefing note of the Regional Day and send to countries and partners – by September 15, 2002;

2. Hold the Second Regional Consultation to discuss and agree on the Regional Day program including session planning and formats with countries and partners – by October 2002;

3. Finalize and agree on the Regional Day Program through various kinds of consultation – by December 15, 2002;

4. Finalize and agree on the logistical plan for the Regional Day at Kyoto Forum including a Regional Statement – by January 15, 2003;

5. Hold the Regional Day in Kyoto and issue the *Regional Statement* including a *Regional Action Plan*;

6. Implement the Regional Action Plan with countries and partners and monitor progress.

ANNEX 1

CONSULTATION AGENDA

Middle East and North Africa
Regional Consultation for the 3rd World Water Forum
June 10-12, 2002, Spain

Draft Agenda

BARCELONA, SUNDAY, JUNE 9 2002	
Evening	Arrival at the Hotel in Barcelona – Registration

BARCELONA, MONDAY, JUNE 10 2002	
8:00 am - 8:30 am	**Departure to Barcelona Metropolitan Area Building**
8:30 am - 9:25 am	**Opening Ceremony**
Chairperson:	Mr. Vahid Alavian
	Welcome allocution, Ministry of Environment, Spain Speaker: Ramón Alvarez Maqueda Director of Waterworks and Water Quality Time: 10 minutes
	Hosting Institution, Metropolitan Area of Barcelona, Spain Speaker: Mr. Jose Ignacio Cuervo, President of Metropolitan Area of Barcelona Time: 10 minutes
	3WWF Secretariat Speaker: Mr. Kenzo Hiroki, Vice Secretary General The 3rd World Water Forum Time: 15 minutes
	World Bank Speaker: Mr. Salah Darghouth Water in the Middle East and North Africa: Barcelona 1997 ~ Barcelona 2002 Time: 10 minutes
	World Bank Speaker: Mr. Satoru Ueda The Partnership Program between the 3WWF and the MNA Regional Water Initiative Time: 10 minutes
9:25 am - 9:55 am	Introduction to the evolution of aquifer management in Spain Speaker: Mr. Llamas Time: 20 minutes Q & A: 10 minutes

9:55 am - 10:35 am	Case of the "Baix Llobregat" in Catalonia, Spain. - Technical Characteristics of the aquifer of the Baix Llobregat Speaker: Mr. Fidel Ribera: International Foundation for Aquifer Hydrology. Time: 15 minutes - Overview of Lessons related to institutional and management issues from the Aquifer of the Baix Llobregat. Speaker: Ms. Josefina Maestu, University of Alcala de Henares Time: 15 minutes Q & A: 10 minutes
10:35 am - 11:00 am	Coffee Break

Management of the Barcelona Aquifer – A Collaborative Process

11:00 am - 11:20 am	The role of the Catalonian Agency for Water in the Management of the aquifer of the Baix Llobregat. Speaker: Andreu Galofre: Catalan Agency for Water
11:20 am - 12: 20 pm	The Water Users Association-Short interventions - Legal status and organizational issues. Speaker: Mr Jordi Codina, Secretary of the Water Users Association of the Delta of the Baix Llobregat. - Management of the aquifer: regulation, control and financial management. Speaker: Josep Maria Niñerola, Technical Director of the Water Users Association. - The role of the municipality in pollution control. Specific cases. Speaker: Josep Ferret, Promoter and Advisor to the Water Users Association. Time: 30 minutes Q & A: 30 minutes
12:20 pm - 12:50 pm	Travel to Agbar Water Company
12:50 pm - 1:50 pm	The Barcelona Private Water Company (Agbar) Speaker: Jose Luis Armenter. Time: 30 minutes Q & A: 30 minutes
1:50 pm - 2:20 pm	Return to Hotel
	Lunch – 2:20 p.m. – 3:30 p.m.
3:30 pm - 4:00 pm	Check Out
4:00 pm	Departure to Barcelona Airport
5:30 pm	Flight departure for Alicante
9:00 pm - 10:00 pm	Reception and Dinner

MURCIA, TUESDAY, JUNE 11, 2002

7:00 am - 8:00 am	Breakfast
Chairperson:	Messrs. Ashok Subramanian and Satoru Ueda
8:00 am - 8:10 am	Welcome allocution, President of the Regional Government Speaker: Mr. Ramon Luis Valcarcel Time: 10 minutes
8:10 am - 8:30 am	Case Study from Jordan, Groundwater Resources Management Speaker: Dr. Elias Salameh Time: 15 minutes Q & A: 5 minutes
8: 30 am - 9:10 am	Case Study from South Western US, Groundwater Resources Management Speaker: Dr. Rashid Al-Hmoud Time: 30 minutes Q & A: 10 minutes
9:10 am - 9: 30 am	Introduction to Segura River Basin Management Speaker: Mr Manuel Miron: Head of Planning of the Segura River Basin
9:30 am - 10:00 am	Coffee Break
10:00 am - 11:00 am	Visit to the HQ of the Segura Basin Authority with Mr. Canovas
11:00 am. – 12:00 am	Travel to Mula by bus
12:00 am - 2:00 pm	Site visit with Mr. Francisco del Amor, President of the Water Users Association
	Lunch -- 2:00 pm - 3:00 pm
3:00 pm - 5:00 pm	Continuation of Site Visit
5:00 pm - 6:00 pm	Return to Hotel
7:00 pm - 9:00 pm	Dinner

MURCIA, WEDNESDAY, JUNE 12, 2002

Chairperson:	Messrs. Ashok Subramanian and Satoru Ueda
9:00 am - 9:45 am	Options and Challenges for Public-Private Partnerships in Irrigation and Water Management in MNA countries Speaker: Dr. S. Requena The case of the Guerdane Project in Morocco Speaker: Mr. H. Lamrani
9:45 am - 10:45 am	Country Group Sessions
10:45 am - 11:15 am	Coffee Break
11:15 am - 1:00 pm	Country Group Sessions
	Lunch – 1:00 pm - 2:00 pm
Chairperson:	Mr. Salah Darghouth
2:00 pm - 4:30 pm	Country/Region preparation for 3WWF, including country statements: • Knowledge sharing and partnership building within the context of the 3WWF/RWI partnership program • MNA session program of the 3WWF in Kyoto 2003 • Post-3WWF activities
4:30 pm - 5:00 pm	Coffee Break
5:00 pm - 6:00 pm	Plenary

Evening and Night in Murcia

MURCIA, THURSDAY, JUNE 13, 2002

Departure to Alicante airport for Barcelona airport and international flight connections

ANNEX 2

PARTICIPANTS' LIST

PARTNERSHIP PROGRAM BETWEEN WORLD BANK
MIDDLE EAST AND NORTH AFRICA REGIONAL WATER INITIATIVE
AND THE 3RD WORLD WATER FORUM SECRETARIAT
REGIONAL CONSULTATION, SPAIN, JUNE 10-12, 2002
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