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## PRIVATE SECTOR PARTICIPATION AND REGULATORY REFORM IN WATER SUPPLY: THE SOUTHERN MEDITERRANEAN EXPERIENCE

by

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The usual caveats apply. In particular, the opinions expressed are the sole responsibility of the author and do not necessarily reflect those of the OECD, the OECD Development Centre or the governments of their member countries.

## PREFACE

Access to safe water represents one of the greatest challenges in a world that is increasingly urbanised and has a rising population to feed. According to the World Water Council, by 2025, about 3.5 billion people could be living in water scarce or water stressed areas.

The OECD has made water a priority and is working to develop policy ideas and identify best practices to assist developed and developing countries meet future water needs in order to prevent a global crisis. With this research, the Development Centre contributes to the mission of the OECD in helping countries achieve sustainable provision of [http://www.oecd.org/document/47/0,3343,en\\_2649\\_37425\\_36146415\\_1\\_1\\_1\\_37425,00.html](http://www.oecd.org/document/47/0,3343,en_2649_37425_36146415_1_1_1_37425,00.html) water services by providing guidance to governments. This work on the Mediterranean region also constitutes inputs to the on-going OECD-MENA Investment Initiative.

The southern Mediterranean region faces one of the most important water crises in the world. Out of the 11 countries of the region, 8 are water scarce (Algeria, Cyprus, Egypt, Jordan, Malta, Morocco, Palestinian Territories and Tunisia). Moreover, several studies predict that climate change will worsen the situation. In addition to water scarcity, the southern Mediterranean region is confronted by uncontrollable urbanisation. By 2030, this region will count 239 million urban residents. Urban population will represent more than 70 per cent of total population in nine countries of the region.

In this context, water is a central issue for economic development and poverty reduction. As outlined by the UN Task Force on Water and Sanitation, two constraints stand in the way of expanding access to water supply and sanitation services: the lack of appropriate institutions, and chronic dysfunction of existing institutional arrangements. Therefore, this paper analyses the institutional organisation of the water sector in southern Mediterranean countries and examines recent regulatory reforms and the development of private sector participation in the context of water crisis. The publication highlights that governments of Mediterranean countries are well aware of the urgency of reforming the water supply sector. Some countries have started to rearrange the organisation of the sector a long time ago; others are still at the beginning of the process. Experience with private sector participation in water services is relatively recent and has proven to be successful when institutional framework is appropriately designed. Finally, the study emphasises that institutional arrangements and pricing policy are the two factors that matter the most in improving water supply.

Javier Santiso  
Acting Director, OECD Development Centre  
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October 2007

## RÉSUMÉ

La région Méditerranéenne fait face à l'une des crises les plus importantes au monde en matière de gestion des ressources en eau. L'aridité, les problèmes géopolitiques, les questions d'allocation de la ressource, la croissance de la demande et les changements climatiques font de l'eau un problème central pour la santé, l'économie et la réduction de la pauvreté. Dans ces circonstances, la réforme institutionnelle du secteur est de toute première importance. Le but de ce papier est donc d'étudier le cadre institutionnel du secteur de l'eau et le développement de la participation du secteur privé dans le contexte de crise que connaît la région Méditerranéenne.

La première partie de cette étude présente l'étendue et les différentes formes de participation du secteur privé dans la gestion des infrastructures d'eau dans le monde. La revue de 22 tests empiriques et de 48 études de cas montre que la participation du secteur privé dans les services d'eau ne conduit pas systématiquement à un gain d'efficacité. La réforme du cadre institutionnel apparaît comme étant un pré requis essentiel à toute opération de privatisation/délégation.

Le papier se concentre ensuite sur la région Méditerranéenne et compare les arrangements institutionnels, les récentes réformes réglementaires et les diverses expériences en matière de délégation des services d'eau en Algérie, en Egypte, en Jordanie, au Maroc et en Tunisie.

Par la suite, il est présenté un nouvel outil d'analyse de l'organisation institutionnelle du secteur de l'eau et du développement de la participation du secteur privé. Ce tableau de bord «Water Sector Analysis Scorecard» repose sur l'étude de 10 dimensions (ressources en eau, utilisation de l'eau, gestion de l'eau, tarification et installation de compteurs, cadre institutionnel, participation du secteur privé, dessalement, besoin d'investissements, conditions démographiques et économiques) et de 49 indices.

Enfin, ce tableau de bord est présenté pour une sélection de pays Méditerranéens. Au regard de leur expérience, l'étude suggère de possibles réformes institutionnelles et conclue sur le futur du secteur privé dans les infrastructures d'eau en Algérie, en Egypte, en Jordanie, au Maroc et en Tunisie.

L'outil d'analyse «Water Sector Analysis Scorecard» développé dans cette étude a pour objectif d'être appliqué à d'autres pays dans le futur. Il est actuellement mis en place à l'OCDE dans le cadre d'une étude sur la participation du secteur privé dans le secteur de l'eau et de l'assainissement dans plus de 30 pays en développement.

## ABSTRACT

The southern Mediterranean region faces one of the most important water crises in the world. The combination of aridity, foreign dependency, climate change, misallocation of the resources and escalating human demand make water supply a primary issue for health, economy and poverty reduction. In this context, institutional reform of the water supply sector is of great interest. Thus, the aim of this study is to examine the water regulatory framework in southern Mediterranean countries and the development of private sector participation in the context of water crisis.

The first part of the study presents the scope of private sector participation in water supply and its different forms around the world. An extensive review of 22 empirical tests and 48 case studies on the effect of private sector participation in water services has been conducted. This survey shows that private sector participation, per se, in water supply does not systematically lead to gains in efficiency. Reforming the institutional framework is an essential prerequisite for delegating water services.

Afterward, the paper focuses on the southern Mediterranean region. It compares institutional arrangements, recent regulatory reforms and experiences with private sector participation in water infrastructure in Algeria, Egypt, Jordan, Morocco and Tunisia.

Subsequently, the study proposes a new monitoring tool to analyse the institutional organisation of the water sector and to assess the future of private sector participation. This Water Sector Analysis Scorecard is based on 10 dimensions (water resource, water use, management of water, water pricing and metering policy, water institutional framework, private sector participation in water supply, desalination, projected investments in water and wastewater services, impact of demography and economic conditions) and on 49 indicators.

Finally, the scorecard is applied to selected southern Mediterranean countries. Based on the experience of different countries in reforming the organisation of the water supply sector, the study suggests possible institutional reforms for Algeria, Egypt, Jordan, Morocco and Tunisia and concludes on the future of private sector participation in water supply in each of these countries.

The Water Sector Analysis Scorecard developed in this study is intended to be applied to more countries in the future. It is now being implemented at the OECD for a broad review of private sector participation in water supply and sanitation infrastructure in more than 30 developing countries.

## I. INTRODUCTION

Water is like no other commodity in the sense that it is essential to human life. It is also essential to economic growth and poverty reduction. About 18 per cent of the world's population lacks access to improved water supply (UN Millennium Project, 2005). According to the World Health Organization, 1.6 million deaths per year can be attributed to unsafe water and lack of sanitation.

The problem of access to water concerns both urban and rural areas. While the number of people not served in rural areas remains very high, it has decreased since 1990. However, the number has increased in urban areas. Governments in developing countries have difficulties to face the rapid expansion of cities. Moreover, the urbanisation trend will accelerate in the coming years: according to the United Nations Population Division, by 2030, the number of people living in urban areas in the less developed regions of the world will increase by 75 per cent; they will represent about four billion out of the five billion urban residents in the world (UNESA-PP, 2006). Thus, based on the 2002 coverage and the United Nations forecast of urban population growth, meeting the water supply Millennium Development Goal by 2015 requires that services will be extended to 1.5 billion more people out of which 960 million will live in cities (Table 1.1).

**Table 1.1 Number of people to whom access must be extended by 2015 to meet the Millennium Development Goal on water**

Region	Number of people to gain access to improved water supply (millions)			Number of people to gain access to improved water sanitation (millions)		
	Urban	Rural	Total	Urban	Rural	Total
Sub-Saharan Africa	175	184	359	178	185	363
Middle East and North Africa	104	30	134	105	34	139
South Asia	243	201	444	263	451	714
East Asia and Pacific	290	174	464	330	376	706
Latin America and Caribbean	121	20	141	132	29	161
Former Soviet Union and Baltic states	27	0	27	24	0	24
Total	960	609	1569	1032	1075	2107

Source: UN Millennium Project 2005. Health, Dignity, and Development: What Will it Take? Task Force on Water and Sanitation.



In the Mediterranean region (MEDA) and more particularly in Middle East and North African countries, the combination of aridity, foreign dependency, misallocation of water resource, climate change, rapid expansion of cities and escalating human demand for water make water supply a primary issue for health, economy and poverty reduction.

The aim of this study is to examine the institutional framework of the water sector in MEDA countries and review the development of private sector participation in the context of water crisis.

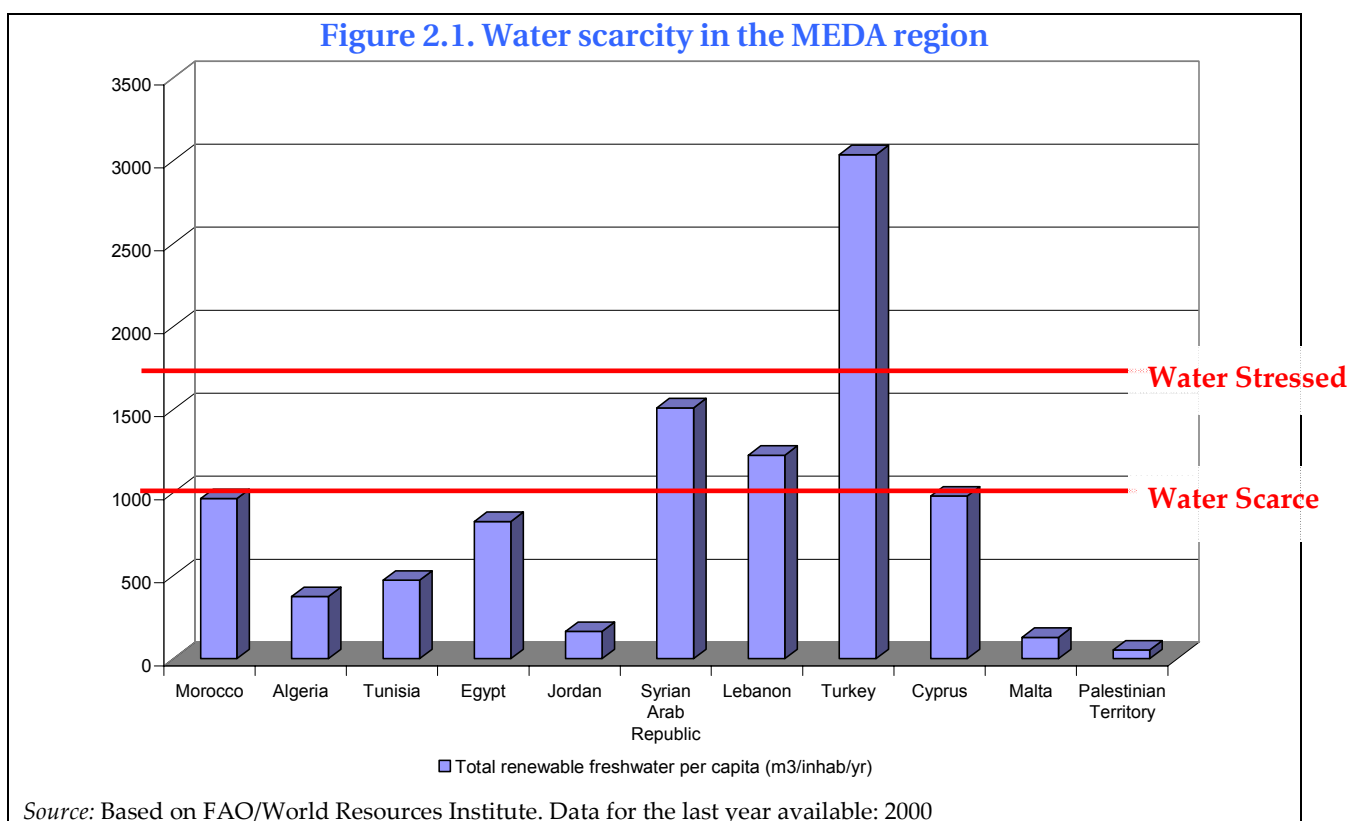
The study is organised as follows. After the introductory section, the second part introduces the importance of the issue of water in the MEDA region. The third part presents the scope of private sector participation in water supply in the world, reviews possible forms of private involvement and proposes a survey of economic literature and empirical studies on the choice of delegating water services. The fourth part focuses on the MEDA region and presents the increasing trend of private sector participation in water supply. The fifth part details institutional arrangements of the water sector in a group of five countries of the Mediterranean region (Algeria, Egypt, Jordan, Morocco and Tunisia), chosen for their economic homogeneity. The sixth part deals with the development of a water sector analysis scorecard and the application of this monitoring tool to the group of countries. Based on the experience of the different countries in reforming the organisation of the water supply sector, the seventh part of the study suggests institutional reforms for Algeria, Egypt, Jordan, Morocco and Tunisia and concludes on the future of private sector participation in water supply in these countries.

## II. THE ISSUE OF WATER IN THE SOUTHERN MEDITERRANEAN REGION

### A. Water scarcity and foreign dependency

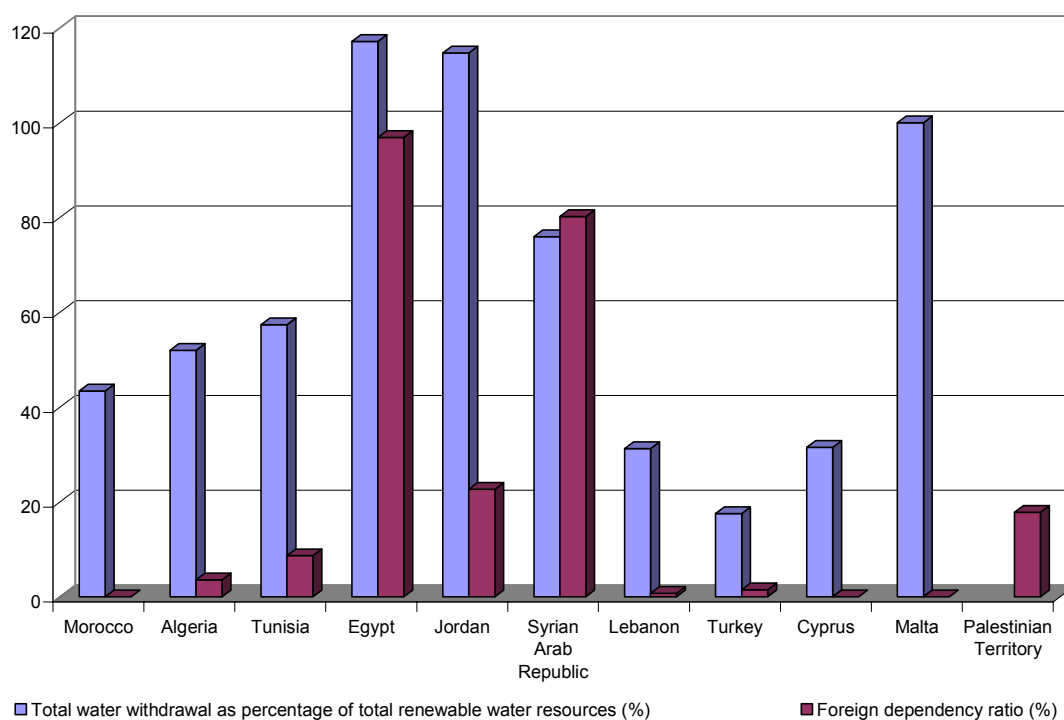
The southern Mediterranean area (MEDA) is the most arid region in the world. Low precipitation and low level of ground water resources lead to over withdrawal problems and foreign dependency concerns. The next two charts present for each country of the region the level of renewable water resources per capita (Figure 2.1) and water withdrawal level and foreign dependency (Figure 2.2).

A country is considered “water stressed” when its total renewable freshwater resources lie between 1 000 cubic meters and 1 700 cubic meters per person per year. “Water-scarce” countries have an average of less than 1 000 cubic meters of renewable fresh water per person per year. Out of the 11 countries of the MEDA region, 8 are water scarce and 2 are water stressed.



With such low renewable water resources, some countries face over withdrawal problems (Figure 2.2). Egypt, Jordan and Malta withdraw respectively 117 per cent, 114 per cent and 100 per cent of their renewable water resources. Much of political tensions in the region are also due to water scarcity and foreign water dependency. It is particularly the case for Egypt, Jordan, the Syrian Arab Republic and Palestine, with respective foreign dependency ratios of 97 per cent, 23 per cent, 80 per cent and 18 per cent.

Figure 2.2: Over withdrawal and foreign dependency in the MEDA region

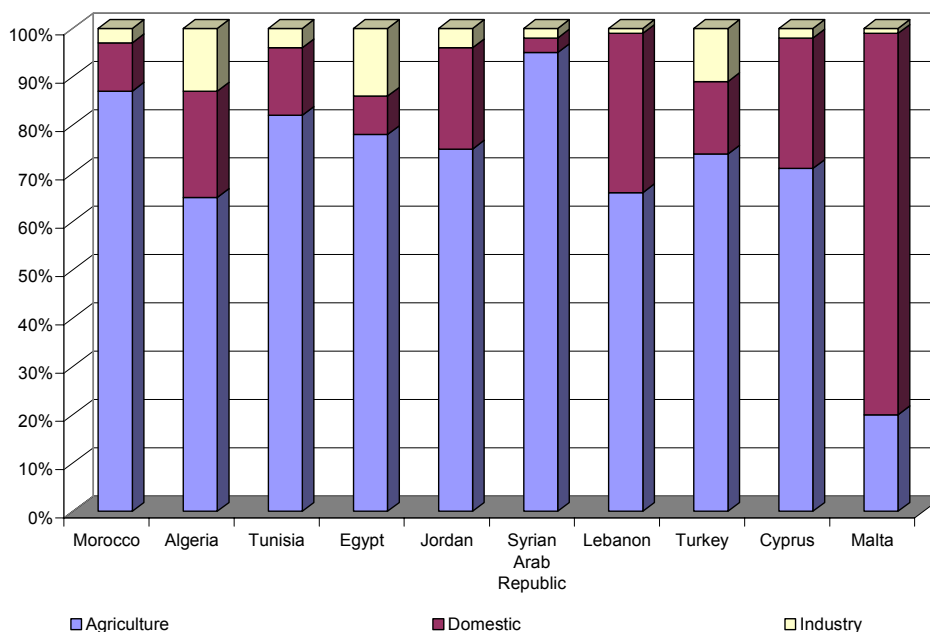


Source: FAO/World Resources Institute. Data for the last year available: 2000. Note: no data available on over withdrawal in Palestinian Territory.

## B. Misallocation of water resource

To understand better the scope of the water scarcity problem in the MEDA region, it is essential to take into account the different uses of water. The chart below (Figure 2.3) presents the breakdown of water use for each country of the region. Overall, more than 65 per cent of the water of the region is used for agriculture. This breakdown is in line with other developing countries, but the average withdrawal for agriculture remains very high in regard to the water scarcity of the region and in comparison with more developed regions. In Europe and North America for example, sector withdrawals are respectively 33 per cent and 38 per cent for agriculture, 52 per cent and 48 per cent for industry and 15 per cent and 14 per cent for domestic use.

Figure 2.3: Sector withdrawals of water in the MEDA region



Source: World Resources Institute, Data for the last year available: 2000.

Table 2.1: GDP contribution of water to agriculture and industry

	GDP (%) contribution of agriculture	GDP (%) contribution of industry	Contribution of 1% of water used by the agriculture to GDP	Contribution of 1% of water used by the industry to GDP
Algeria	9.8	56.6	0.15	4.35
Egypt	15.1	36.9	0.19	2.64
Jordan	2.8	28.8	0.04	7.20
Lebanon	6.9	20.8	0.10	20.80
Morocco	15.9	30.4	0.18	10.13
Syrian Arab Republic	23.1	27.2	0.24	13.60
Tunisia	12.6	27.8	0.15	6.95
Turkey	12.9	22.4	0.17	2.04

Source: Author's calculation based on World Resources Institute / FAO data for 2004.

Water is a particular good in the sense it is essential to human life. However, water is also an economic good and is used as an input for industry and agriculture. The next table (Table 2.1) presents the contribution of water to the GDP according to its use, agricultural or industrial. Overall, the contribution of water to the GDP is very much lower for an agricultural use than for an industrial use. It confirms a problem of misallocation of water resource, which is due to the inefficient pricing policy of water in the MEDA region. In some wet regions of the world, an

inefficient pricing policy of water can eventually be understood as a public choice in order to subsidise agriculture. In arid regions, like the MEDA area, it is essential to recognise the economic value of water and to price this resource efficiently.

### C. Consequence of population growth

In addition to the problem of allocation of the resource, the expected population growth in the region (Table 2.2) should increase water scarcity. Based on United Nations' estimates (UNESA-PP, 2006), the population of the MEDA region should increase by 38 per cent and represent about 352 million inhabitants in 2030. With an expected increase of 63.8 per cent over the next 25 years, the urban population growth is even more impressive. By 2030, there will be 239 million people living in cities in this region. Urban population will represent more than 70 per cent of total population in 9 out of the 11 countries of the region. Algeria, Morocco, the Syrian Arab Republic, Egypt and Jordan will be particularly concerned by the rapid expansion of cities. Egypt and the Syrian Arab Republic are extreme cases; the urban population will increase by more than 85 per cent over the next 25 years.

**Table 2.2: Population growth in the MEDA region**

	Population growth from 2005 to 2030 (%)	Urban population growth from 2005 to 2030 (%)	Percentage of population living in urban areas in 2005	Percentage of population living in urban areas in 2030
Algeria	36.1	64.8	60.0	72.6
Cyprus	25.9	38.6	69.5	76.5
Egypt	44.6	85.0	42.3	54.1
Jordan	52.1	62.2	79.3	84.6
Lebanon	23.8	29.4	88.0	92.0
Malta	8.0	11.4	92.0	94.9
Morocco	33.5	64.7	58.8	72.5
Syrian Arab Republic	57.4	87.2	50.3	59.8
Tunisia	22.5	41.7	64.4	74.4
Turkey	28.3	48.1	67.3	77.7
Palestinian Territory	93.7	116.9	71.9	80.5
MEDA region	38.0	63.8	57.3	68.0
World	26.8	56.9	49.2	60.8

*Source:* Author's calculations based on the 2004 estimates of the United Nations Population Division

### D. Impact of climate change

Water resources are also inextricably linked with climate. With current information available, it is very difficult to predict the impact of climate change on water resources in the MEDA region. However, there is a high probability that climate change might worsen the problem of water scarcity in the coming years (Box 2.1).

Egypt offers a good example of vulnerability of the region to climate change. As said previously, Egyptian water resources depend mostly on foreign countries. Indeed, its major

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water source, the River Nile, comes mainly from Ethiopia. Thus, Egypt is very much concerned by the climate of Ethiopia and several models project that rainfall in Ethiopia would highly decrease and become more erratic during the next 50 years. This scenario would have catastrophic human and economic consequences for Egypt.

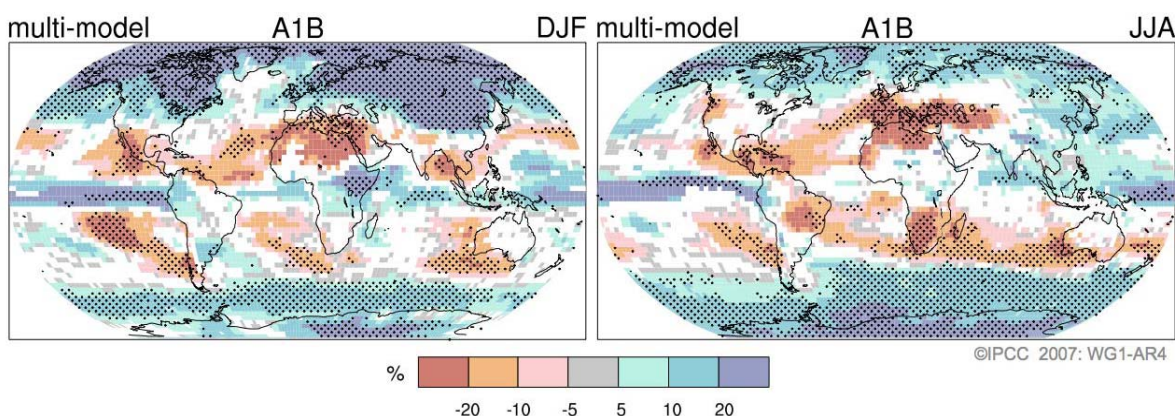
### Box 2.1: The impact of climate change on rainfall in North Africa

“Climate change scenarios for Africa, based on results from several general circulation models using data collated by the Intergovernmental Panel on Climate Change (IPCC) Data Distribution Center (DDC), indicate future warming across Africa ranging from 0.2°C per decade (low scenario) to more than 0.5°C per decade (high scenario). [...] Under intermediate warming scenarios, most models project that by 2050 North Africa will experience decreases [in rainfall] during the growing season that exceed one standard deviation of natural variability”.

Source: Intergovernmental Panel on Climate Change (IPCC). (2001) *Impacts, Adaptation and Vulnerability*. p 489. Cambridge University Press.

The next figure (Figure 2.4) presents projected relative changes in precipitation (in percentages) for the period 2090–2099, relative to 1980–1999. According to the Intergovernmental Panel on Climate Change (2007), precipitation in most of the Middle East and North African region is expected to decrease by 20 per cent.

Figure 2.4: Projected Patterns of Precipitation Changes



Values for winter season December to February (left) and summer season June to August (right). Source: Intergovernmental Panel on Climate Change (IPCC) (2007): *The Physical Science Basis, Summary for Policymakers*, p16.

### III. PRIVATE SECTOR PARTICIPATION IN WATER SUPPLY

#### A. Possible forms of private sector participation

There are very different forms of private sector participation in water delivery (Table 3.1): from the minimum involvement, the service contract to the full divestiture as in the United Kingdom and Chile.

The seven major types of private involvement are the service contract, the management contract, the lease contract (“Affermage”), the Build-Operate-Transfer (BOT) contract, the concession contract, the joint venture contract and the divestiture.

Under a service contract, the participation of the private sector is very limited. It provides technical and administrative tasks, such as repairs, meter reading or payment collection. The private sector does not bear any commercial risk regarding water supply. The contract period rarely exceeds one or two years. This contract is adapted to all situations even when the regulatory framework is particularly weak.

Under a management contract, the private sector takes over operation and management responsibilities. However, the user remains, legally, the client of the public entity. The private contractor is paid on a “fee per unit” basis defined in the contract: per volume of water sold, per number of connections and other like management and operational tasks. The duration of the contract is usually three to five years and the private company does not bear commercial risks regarding water supply.

The lease contract differs from the management contract in the sense that the private company assumes the legal responsibility for operating the service in exchange for payments for the use of the fixed assets. Users become direct clients of the private contractor, which bears a much more important part of commercial risks. However, it is not in charge of capital investment. In exchange for greater risks, the leaseholder receives a part or the totality of water revenues. The duration of the contract is usually of 10 to 12 years.

Under a Build-Operate-Transfer contract, the private sector is in charge of designing, building and financing a new investment project. It has also to operate and maintain it for the concession period and then hand it over to the public sector. This mechanism has the advantage of not increasing the sovereign debt. This type of contract is usually used for construction of water production and desalination plants and the sale of bulk water to the public provider rather than for water distribution. Currency risks and the significant length of legal negotiation increase the cost of projects financed under a Build-Operate-Transfer contract.

The concession contract is similar to the lease contract, but the concessionaire is in charge of financing the expansion and the rehabilitation of the network. As in the lease contract, users

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are direct clients of the private contractor. The duration of the contract ranges between 25 and 30 years. At the end of this period, the private operator hands over the installation to the state.

Under a joint venture contract, the state or municipality and a private operator co-owns the water operator. Usually, the private sector holds the largest part of the newly created company, but in some cases, the state can have a “golden share”. The two shareholders share responsibilities and benefits. Even if this agreement seems adapted to the politically sensitive case of water supply, such kind of contract can be very unstable.

The last form of private sector participation in water supply is the full divestiture. Under this arrangement, assets are sold entirely to the private sector. The private operator is in charge of financing, operation, management and bears all the risks. However, these private monopolies remain overseen by the public sector and independent regulatory agencies.

## **B. Scope of private water provision in the world**

On an international scale, private water supply constitutes an exception. Only 5 per cent to 10 per cent of the world’s population receives its drinking water from a private operator. Opponents to private sector participation in water supply quote often this low percentage in order to insist on the unusual nature of private provision.

However, this percentage is much more important for urban areas and even more important in high-income countries (Chart 3.1). The private sector serves 25 per cent of urban dwellers in the world (Nickson and Franceys, 2003). In high-income countries, more than one urban resident in three is delivered by a private operator. Thus, private water provision is not exceptional.

Private sector participation in water supply is not a new phenomenon either. Indeed, during the 19<sup>th</sup> century, private provision of drinking water was prevalent in France, the United Kingdom and the United States (Gentry and Auyuan, 2000).

The real novelty is the increase of private sector participation in water supply in developing countries during the last 15 years. In 1991, the percentage of urban residents served by the private sector was 0 per cent, 1 per cent and 2 per cent respectively for Low Income Economies, Middle Income Economies and Upper Middle Income Economies. In 10 years, this percentage has increased to about 5 per cent, 10 per cent and 35 per cent respectively (Figure 3.5).

In which countries is drinking water privately provided? There are great disparities among countries. The map below (Figure 3.6) presents an estimate of the percentage of people delivered by the private sector per country.



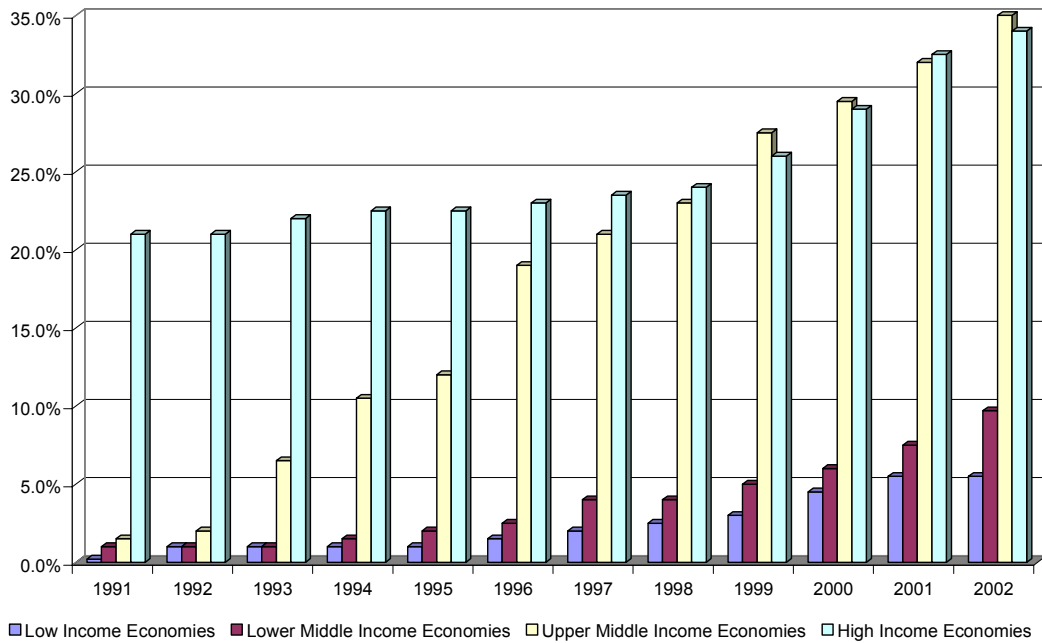
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Table 3.1: Forms of private involvement in water supply

Option	Setting performance standards	Asset ownership	Capital investment	Design and build	Operation and maintenance	Commercial risk	Oversight of performance and fees	Duration (years)
Service contract	Public	Public	Public	Public	Shared Public/Private	Public	Public	1–2
Management contract	Public	Public	Public	Public	Private	Public	Public	3–5
Lease contract "Affermage"	Public	Public	Public	Public	Private	Shared Public/Private	Public	10–12
Build-Operate-Transfer	Public	Private Bulk services	Private	Private	Private	Private	Public	20–30
Concession contract	Public	Public	Private	Private	Private	Private	Public	25–30
Joint Venture	Public	Shared Public/Private	Shared Public/Private	Shared Public/Private	Shared Public/Private	Shared Public/Private	Public	Indefinite
Divestiture	Public	Private	Private	Private	Private	Private	Public	Indefinite

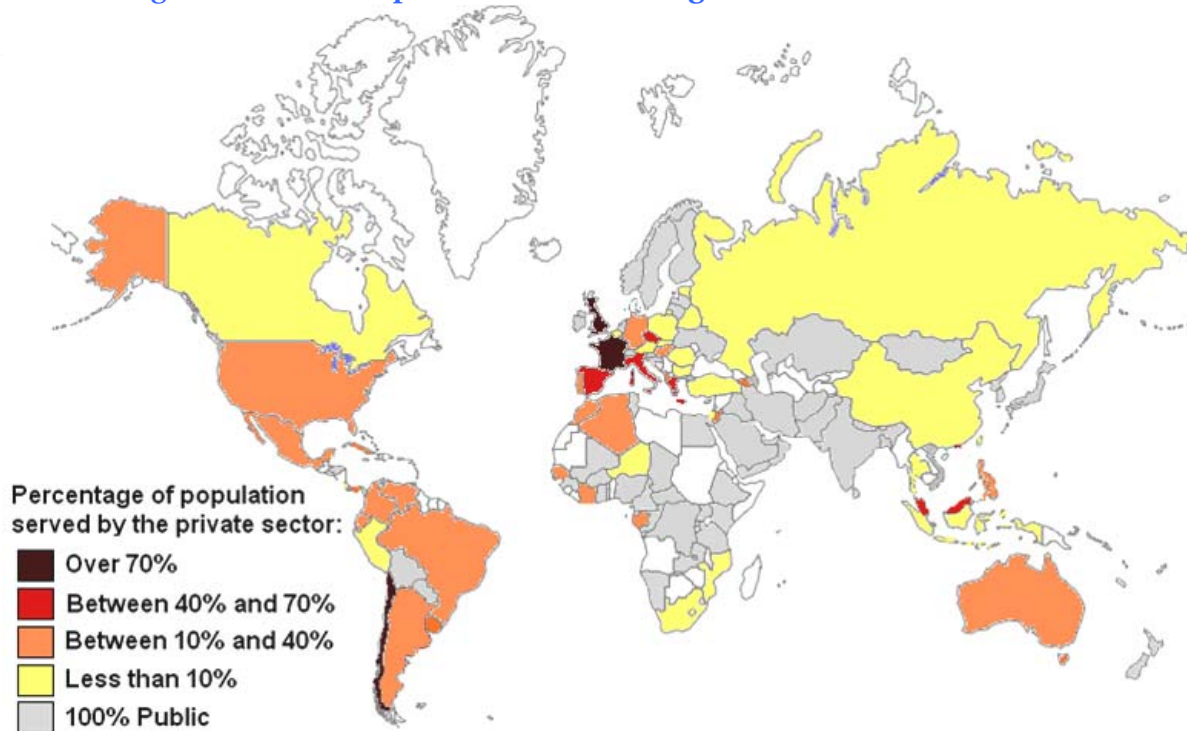
Source: Adapted from Bradford Gentry, Yale-UNDP Collaborative Program, 1998.

**Figure 3.5: Private provision of drinking water in urban areas**  
 Percentage of urban population served by the private sector



Source: Based on IWE, Cranfield PPP Database, Nickson and Franceys, 2003.

**Figure 3.6: Private provision of drinking water in the world in 2006**



Edouard Pérard, Yale School of Forestry and Environmental Studies 2006.

Source: Pérard (2006) Based on literature review and direct interviews.

The United Kingdom and Chile are the only two countries that have fully privatised their water services. In all other countries, when private provision is possible, it co-exists with the public system. In Western Europe, about 45 per cent of the population is delivered by a private water operator, while this percentage is only around 15 per cent for the United States (Pinsent Masons, 2006). In France, Czech Republic, Malaysia, Spain, Italy and Greece, private water supply is particularly important.

### **C. Is private provision of water better than public delivery? The economic theory.**

The issue of public versus private has been widely discussed during the last 20 years, but economic theories applied to the particular case of water monopolies remain ambiguous and cannot completely prove the superiority of one model versus the other one.

In the existent literature, the two most widespread explanations of the choice between public and private ownership and operation are corruption and efficiency.

One of the advantages of public ownership and operation would be that it could reduce corruption. Glaeser (2001) identifies three risks in particular: the under pricing of public inputs to the private sector, the over pricing of private outputs to the public and the subvention of the private by the public. These risks exist, but the public operation does not solve the problem of corruption but moves it forward: a public supplier can also overpay private inputs. As well, private companies can corrupt public suppliers.

The argument of corruption is as much used by opponents to the involvement of the private sector in water supply than by pro-private sector participation. A switch of ownership and operation does not solve the problem of corruption.

The argument of efficiency takes a much larger place in the literature. Most theories consider it as the determinant of privatisation. However, theories do not agree on the effect of private ownership and operation by itself.

State-owned enterprises are seen usually as less efficient than private firms are. Some argue that private ownership and operation by itself can improve the performance of firms (Boardman and Vining, 1992; Nellis 1994; Boycko *et al.*, 1996; Brada, 1996; and Shleifer 1998), others argue that the efficiency depends on the combination of three factors: the ownership, the competition and the regulation. Competition and regulation would be more important than privatisation in improving performances of firms (Yarrow, 1986; Kay, Mayer and Thompson, 1986; Bishop and Kay, 1986; Vickers and Yarrow, 1991). Thus, in a fully competitive market, the private sector would be more efficient than the public one; but the answer would be less clear for less competitive markets like water supply and sanitation.

As a natural monopoly, it is impossible to turn the water supply industry into a fully competitive market. The nature of the costs does not permit the duplication of the network and the fragmentation of the market would limit the economies of scale. The direct competition is not desirable and/or possible.

Demsetz (1968) proposes a solution to introduce competition in monopoly markets: the competition for the market. However, Williamson (1976) and Goldberg (1976) find several problems with this approach: the bidding may not be competitive because of collusion, asymmetric information, incumbent advantages and problems in the pricing of the assets.

These arguments apply perfectly to the water sector where the number of bidders is usually small. Moreover, bids for water supply are incomplete contracts (Williamson, 1976).

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Competition for the market in water supply and sanitation cannot fully substitute direct competition. Thus, without a full competitive market, the theory remains unclear about efficiency gains of private sector participation in water by itself.

Because of the incomplete nature of water delegation contracts, private sector participation must be combined with an adapted institutional framework in order to increase efficiency in water supply (Box 3.1). A well-defined regulatory environment needs to be established before delegating water services. This is a condition to any successful reform.

**Box 3.1: The importance of regulation for private sector participation in water services**

“A complete contract would be immensely complex and extremely difficult to write, monitor and enforce. Indeed it would be very hard for the government to commit not to vary some contract terms as events unfold. Much more likely, then, is some kind of incomplete contract that leaves a number of aspects to be resolved. But this is effectively just what regulation involves—a continuing task of contract monitoring, enforcement and renegotiation. Thus in circumstance of any complexity, franchising does not do away with the need for regulation”.

Source: Armstrong Mark, Simon Cowan and John Vickers, (1994)

#### **D. Empirical studies on the effect of private sector participation in water services**

Empirical works confirm the theory’s ambiguity about the effect of ownership in monopolistic markets.

In a study on 21 African water utilities from 1995-1997, Estache and Kouassi (2002) found that private operators are more cost-efficient.

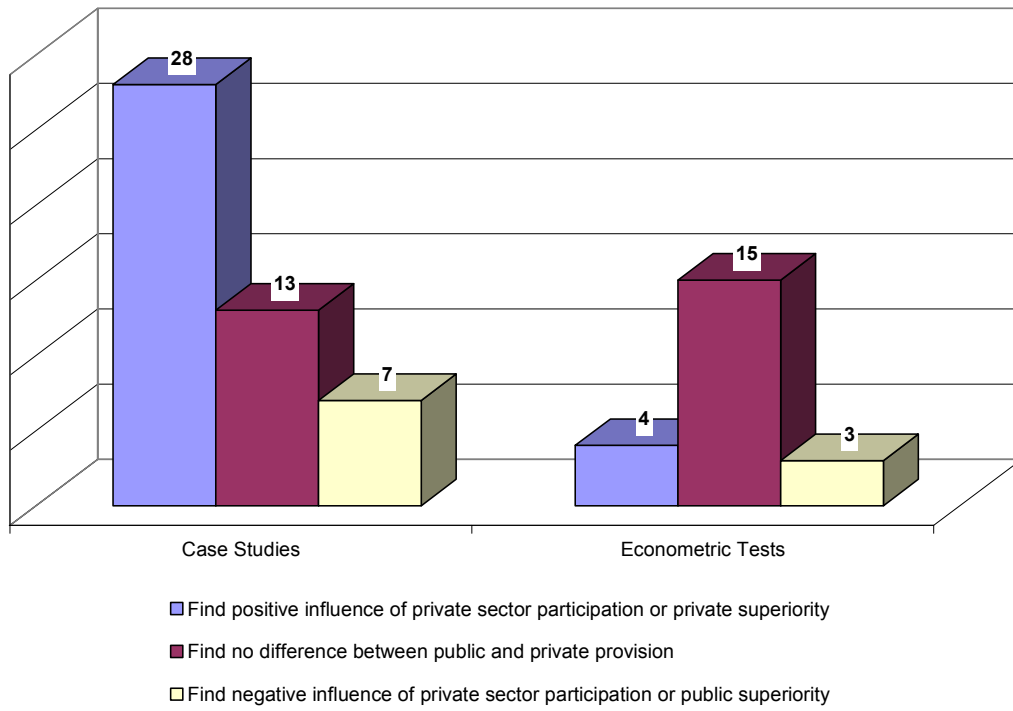
However in another econometric test on 110 African water utilities from 1998-2001, Kirkpatrick *et al.* (2004) found no significant difference between public and private operators in terms of cost for which environmental factors have been accounted.

Using a sample of 50 firms in 19 Asian countries in 1997, Estache and Rossi (2002) also found no statistically significant difference between public and private water operators in the sector.

The Annex presents an extensive review of econometric tests and case studies on the effect of private sector participation in water services. The result of this survey is summarised below (Figure 3.7).

Empirical works on the effect of private sector participation in water services are contradictory. The fact that most of these studies do not take into account the institutional framework might explain these mixed results. A well-defined regulatory environment is essential for successful private sector involvement in water services.

**Figure 3.7: A review of 48 case studies and 22 econometric tests on the effect of private sector participation in water services**



Source: Pérard (2007).

## **IV. THE SCOPE OF PRIVATE WATER PROVISION IN THE SOUTHERN MEDITERRANEAN REGION**

### **A. A cross-country comparison**

Private water services are relatively recent in the Mediterranean region. The first public-private partnership was introduced in 1992 for the wastewater of Cairo. Countries of the MEDA region can be classified in three categories depending on the percentage of population delivered by the private sector.

The most “active” group includes Morocco, Jordan and Algeria. Jordan has the largest share of private water supply in the region: about 40 per cent of its population receives drinking water from a private provider (as of December 2006). Private water operators have been present in Morocco, Jordan and Algeria respectively since 1997, 1999 and 1999.

The second group consists of countries where private sector involvement in water supply is low, but where the private model is expected to increase in the coming years. It comprises Egypt, Lebanon and Turkey.

The third group is constituted by Tunisia, the Syrian Arab Republic, Cyprus and Malta, where private provision is quasi-inexistent.

The following map (Figure 4.8) presents the percentage of population served by the private sector for each country of the MEDA region.

### **B. Detailed outlook of private involvement in water services**

As discussed previously, there is a wide range of options for private sector participation in water services. Besides the full divestiture, all forms of public-private partnership are represented in the MEDA area.

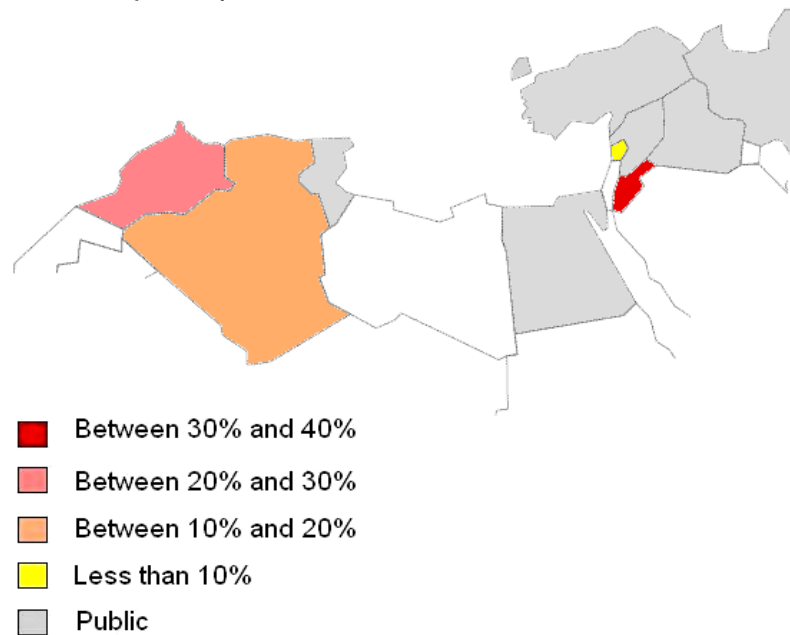
Morocco is the most active country in outsourcing water supply. It is the only country in the area that has awarded concession contracts. The duration of the contracts varies between 20 to 25 years. In Jordan, private water provision is more important in percentage, but the state delegates less responsibilities to the private sector by awarding management contracts for five years.

After a few years experience with service contracts, Algeria signed for the first time a BOT contract for a desalination plant in 2001, and outsourced in 2005 the water supply of Algiers by awarding a management contract to Suez. After the first five years, more responsibilities might be delegated to the private sector and the contract could turn into a concession contract.

Besides geopolitical problems, Lebanon and Palestine are also starting to outsource water supply. A management contract was awarded in 1996 for water supply in Gaza and two others were awarded in Lebanon for water supply in Tripoli and Baalbeck.

**Figure 4.8: Private Sector Participation in Water Supply in the MEDA Region**

Estimate of the percentage of population served by the private sector in 2006



Source: Pérard (2006).

#### **Box 4.1: Service contract for the rehabilitation of water systems in Constantine, Algeria**

In May 2005, SOMEDEN, a subsidiary of Société des Eaux de Marseille, was awarded a service contract for the rehabilitation of the water supply network of the city of Constantine in Algeria. This 36-month contract represents 60 million Euros and is directly financed by the government of Algeria. The 3 main tasks of the private contractor are the renovation of 68 kilometres of pipes, leakage repairs in order to reduce unaccounted for water to 25 per cent and modernisation and computerisation of the commercial management. In addition, the contract specifies a consulting activity and SOMEDEN has to elaborate a 20-year business plan for the local water agency.

**Box 4.2: Management contract for water and wastewater services of the city of Algiers, Algeria**

In November 2005, SUEZ Environment was awarded a contract for the management of the water and wastewater services for the 3.5 million inhabitants of the city of Algiers. This contract between SUEZ and the National Office of Wastewater, the Algerian Water Authority, runs for an initial term of 5 years and is worth nearly 120 million Euros overall. Its general objective is to upgrade and modernise the Algiers water and wastewater utilities so that they are more reliable over the long term. One of the main priorities is to improve service quality, with particular regard to providing a 24-hour-a-day water supply within 3.5 years. Suez Environment is also in charge of transferring its expertise and training the 3 000 employees of the local water company, Société des Eaux et d'Assainissement d'Algiers (SEAL). The entire investment is funded by the Algerian authorities, which have devoted 200 million Euros per year to the gradual modernisation of the water supply and sewage treatment facilities.

In Tunisia, private sector participation concerns only wastewater with limited service contracts. In Egypt and Turkey, private sector participation is also very restricted, but should increase in the coming years.

The four following boxes present concrete examples of different forms of private sector participation in water services in MEDA countries as described previously.

**Box 4.3: BOT contract for entire wastewater treatment of Greater Amman, Jordan**

In January 2002, the Jordanian authorities selected the Samra Plant Consortium for a 25-year wastewater BOT contract. The SPC consortium is a joint venture, composed of two American partners: Morganti USA and Infilco Dégremont Inc., the water treatment plant subsidiary of SUEZ Environment in North America. The private contractor is responsible for the design and construction of the Khirbet As Samra wastewater treatment plant, the extension and conformity of the Ain Ghazal pre treatment plant. SPC is also responsible for operating both plants along with pumping stations in the Zarqa Gouvernorate in the northeast of Amman. The Khirbet As Samra plant has an average capacity of 268 000 m<sup>3</sup>/day and treats the sewage of 2.5 million inhabitants in Amman and its surrounding areas. The project represents an initial investment of USD 150 million and is supposed to generate a total annual turnover of USD 15 million for the 25-year duration. SUEZ has been present in Jordan since 1999 through its local subsidiary LEMA that managed water distribution for Amman until December 2006.



**Box 4.4: Water, wastewater and electricity concession contracts in Tangier and Tetouan, Morocco**

In 2001, the urban communities of Tangier and Tetouan (more than one million inhabitants) awarded management of their water, wastewater and electricity services to Amendis, a Veolia Water subsidiary, following an international call for tenders.

The primary objectives of these 25-year concession contracts are:

1. The extension of water, electricity and wastewater services in areas of urban development that are not served, or only poorly, by facilitating access to these services for underprivileged people (40 000 subsidised water and wastewater connections across the entire Tangier-Tetouan concession area).

2. The construction during the first five years of wastewater treatment plants and sea sewer outfalls.

3. The extension of the collection system by over 200 km during the first 10 years.

The next table (Table 4.1) presents details of the major contracts in water treatment, supply and sanitation in the southern Mediterranean region.

**Table 4.1: Detailed outlook of private sector participation in water treatment, supply and sanitation in the MEDA Region**

Country	Location	Sector	Type of contract	Date	Private contractor
Algeria	Oran	WSD	Service Contract	1999-2004	Saur
Algeria	Algiers Ouest	WSD	Service Contract	2000-2004	Someden (SEM)
Algeria	Constantine	WSD	Service Contract	2005-2008	Someden (SEM)
Algeria	Beni Haroun	Water pumping station	Build-Operate-Transfer	2002-	Alstom / Dragados
Algeria	Arzew	Desalination	Build-Operate-Transfer	2001-	Black and Veatch
Algeria	Bredeah	Desalination	Build-Operate-Transfer	2001-	Degremont (Suez)
Algeria	Algiers	WSD	Management Contract	2005-2010	Suez
Algeria	Taksbet	WT	Design Build Operate	2006-2011	Degremont (Suez)
Algeria	Athmania	WT	Design Build Operate	2006-2011	Degremont (Suez)
Egypt	Toshka	Irrigation	Build-Operate-Transfer	2002-	N/A
Egypt	Cairo	WWT	Management Contract	1992-1996	Joint-Venture Biwater (UK) / ECD (Egypt)
Egypt	Suez Special Economic Zone	WWT	Build-Operate-Transfer	2001-2002 (suspended)	SNC Lavalin
Jordan	Amman	WSD	Management Contract	1999-2006	LEMA Consortium (Suez)
Jordan	Al-Samra	WWT	Build-Operate-Transfer	2002-2027	Degremont (Suez) /Morganti
Jordan	Ramtha	WWT	Build-Operate-Transfer	2001-	Veolia
Lebanon	Chekka	WWT	Design Build Operate	2003-2008	Ondeo (Suez)
Lebanon	Batroun	WWT	Design Build Operate	2003-2008	Ondeo (Suez)
Lebanon	Jbeil	WWT	Design Build Operate	2003-2008	Ondeo (Suez)
Lebanon	Nabatieh	WWT	Design Build Operate	2003-2008	Veolia

Lebanon	Chouf	WWT	Design Build Operate	2003-2008	Veolia
Lebanon	Tripoli	WWT	Design Build Operate	2003-2006	Suez
Lebanon	Tripoli	WSD	Management Contract	2003-2005	Suez
Lebanon	Baalbeck	WSD	Management Contract	2003-2006	N/A
Morocco	Rabat	WSD/WWT	Concession Contract	1999-2029	Redal (Veolia)
Morocco	Casablanca	WSD	Concession Contract	1997-2027	LYDEC (Suez)
Morocco	Tetuouan and Tangiers	WSD/WWT	Concession Contract	2002-2027	AMENDIS (Veolia)
Morocco	Marrakech	WWT	Design Build Operate	2006-2011	Degremont (Suez)
Tunisia	Tunis South	WWC	Service Contract	2001-2005	SRA/SAVAC/SOMEN
Tunisia	Tunis North	WWC	Service Contract	2002-2006	SOMEDEN (SEM)
Tunisia	Ariana Governorate	WWC	Service Contract	2002-2006	SOMEDEN (SEM)
Tunisia	Tataouine City	WWC	Service Contract	2002-2006	SRA/SAVAC/SOMEM
Turkey	Izmit	N/A	Build-Operate-Transfer	1996-	RWE
West Bank & Gaza	Bethlehem and Hebron	WSD	Management Contract	1999-2003	GEKA (Veolia)
West Bank & Gaza	Gaza	WSD	Management Contract	1996-2000	LEKA (Ondeo-Suez)

WSD: Water Supply Distribution

WT: Water Treatment

WWT: Wastewater Treatment

WWC: Wastewater Collection

Source: Perard (2007). Based on Grover 2002, Institutional Communication of Suez, Degremont, Veolia, Societe Des Eaux de Marseilles, Press Releases.

## **V. WATER INSTITUTIONAL ARRANGEMENTS IN SELECTED MEDITERRANEAN COUNTRIES**

The southern Mediterranean area consists in a very heterogeneous group of countries with significant economic, political and cultural differences. Thus, rather than providing an overview of institutional arrangements of the water sector for each country of the region, the focus is on a more homogenous group of five countries: Tunisia, Algeria, Egypt, Morocco and Jordan.

### **A. Successful public management in Tunisia**

Tunisia has very limited water resources. The amount of renewable freshwater available per inhabitant is 50 per cent below the water scarcity standard. Moreover, this situation is exacerbated by irregular annual precipitation. In addition, water supply is confronted by two major constraints: the remote location of water resources and the low quality of water. The remoteness of water resources from consumption centres results in heavy water transfer infrastructure investments and the low quality of water resources with high salinity increases the cost of water treatment. Thus, Tunisia has made water management one of its first priorities and so far, the strategy adopted has been successful.

In Tunisia, water and sanitation sectors are totally public and are managed by two centralised government agencies:

SONEDE, Societe Nationale d'Exploitation et de Distribution des Eaux, the autonomous national public water supply utility is responsible (since 1968) for delivering potable water in Tunisia, including construction, operation and maintenance of infrastructure. While its mandate traditionally focused on urban areas, in recent years SONEDE has been expanding its operations in rural areas as well. SONEDE employs more than 6 900 people and delivers water to about 8 million people. SONEDE is overseen by the Ministry of Agriculture and Water Resources, which formulates water sector strategies and coordinates investment planning and the allocation of the resources.

ONAS, Office National de l'Assainissement, the autonomous national public sewerage utility is responsible (since 1974) for sewerage collection, treatment and disposal in about 152 urban agglomerations, industrial and tourist zones. Since December 2004, ONAS has been overseen by the Ministry of Environment and Sustainable Development, which sets policies and investment priorities for the sanitation sector. Moderate private sector participation has been introduced recently as service contracts for sewerage and with BOT contracts in June 2006.

In addition to these two major national agencies, the Direction Générale des Grands Travaux Hydrauliques is responsible for the construction of large dams and irrigation infrastructure, and the Direction Générale du Génie Rural et de l'Exploitation des Eaux is responsible for water resources management, irrigation supply, as well as of drinking water supply and sanitation in dispersed rural areas not covered by SONEDE or ONAS.

Water management in Tunisia is centralised and politicised. SONEDE and ONAS are committed through Contrat-Programme to achieve specific service and infrastructure goals. Their tariffs are revised periodically but not systematically, on an as-needed basis. Tariff adjustment requests are submitted to the oversight ministry, which has the option to transmit it for evaluation to a Ministerial Council headed by the Prime Minister. The tariff adjustment decision does not always follow economic rationality and does not respect prior formal commitments either.

However, the performance of these agencies has been impressive by a number of criteria. For example, Tunisia has one of the lowest rates of unaccounted for water in the region. Unaccounted for water was about 30 per cent in 1987, and decreased to 21 per cent in 1997 and to 18.2 per cent in 2004 (World Bank, 2005a). In addition, 100 per cent of urban residents have access to safe drinking water with household connection rates of 98 per cent. Contrary to other cities of the southern Mediterranean region, Tunisian cities usually have continuous water supply. The bill collection rate of SONEDE, which is also in charge of the billing activity of ONAS, is very high at over 99 per cent.

Nevertheless, operational results of SONEDE and ONAS have recently deteriorated because of deferred tariff adjustments and an ambitious capital programme for rural service expansion. Since 2001, the operating ratio of SONEDE remained consistently below 100 per cent.

Furthermore, the tariff system in Tunisia does not seem sustainable in the long term. Contrary to other countries in the region, water and sanitation tariff structures are applied uniformly across the nation. Thus, they do not reflect the real economic cost of water and differences of cost from one region to another.

The second pricing problem is the high level of cross subsidies among customers. SONEDE tariff structure has two components: a fixed component and a variable component, which is proportional to consumption. There are five blocks of tariffs (Table 4.1 and 4.2).

**Table 4.1: Tariff of water supply in Tunisia in 2007 in Tunisian Dinars per m<sup>3</sup>**

0-20 m <sup>3</sup> per quarter	21-40 m <sup>3</sup> per quarter	41-70 m <sup>3</sup> per quarter	71-150 m <sup>3</sup> per quarter	more than 150 m <sup>3</sup> per quarter
0.14	0.24	0.3	0.545	0.84

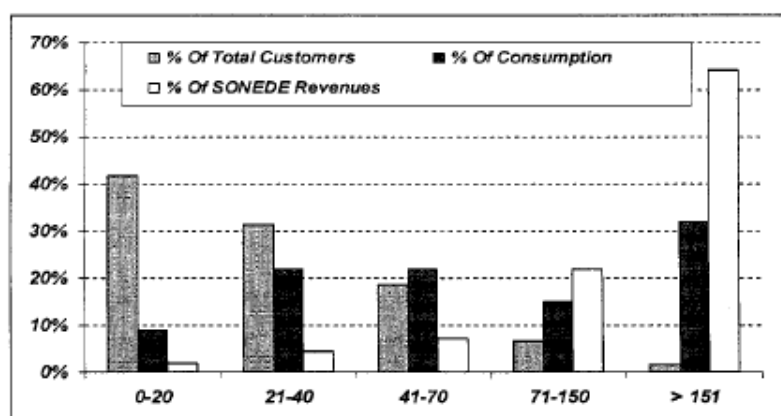
Source: SONEDE, March 2007. <http://www.sonede.com.tn/>

**Table 4.2: Fixed Charges for water supply in Tunisia in 2007 in Tunisian Dinars per quarter**

Pipe Diameter	15	20	30	40	60	80	100	150
Dinars per quarter	3.300	5.830	10.740	20.570	53.460	53.460	82.810	220.670

Source: SONEDE, March 2007. <http://www.sonede.com.tn/>

Differences of price are very important between blocks and between levels of fixed charge. The last tariff represents about six times the first one and three times the second one. The last level of fixed charge is 66 times greater than the first one. Thus, 10 per cent of customers pay for more than 80 per cent of the population and only 3 per cent of customers generate 65 per cent of SONEDE revenues (Figure 4.9). In fact, 90 per cent of users pay water prices below the real economic cost (SONEDE, 2007). This tariff structure represents a risk; large customers could switch to independent private water systems. Such levels of cross subsidies do not seem viable in the long term.

**Figure 4.9: High level of cross subsidies among Tunisian customers*****Distribution of SONEDE customers, revenues and volumes sold per level of tariff.***

Source: World Bank 2005, Official Project Appraisal Document on a Proposed Loan to SONEDE for an Urban Water Supply Project.

## B. Promising regulatory reform in Algeria

Algeria faces crucial water scarcity, it has the lowest renewable water resources of North Africa (373.2 cubic metres of renewable freshwater per capita per year). This problem is aggravated by the poor condition of the water pipes network. The water and sewage networks, built in the 1980s, have been allowed to deteriorate badly. In some cities, such as Algiers, up to 40 per cent of the water carried by the network is lost (ABS Energy Research, 2006). The technical losses are around 32 per cent, the other 8 per cent is lost due to illegal consumption.

Moreover, the mediocre management of the national water supply agency, Algerienne des Eaux (ADE), has worsened the situation. ADE is owed 293 million Euros because of irregular payments by customers and illegal connections (Global Water

Intelligence, 2005). The National Sanitation Office observed, in 2005, that current tariffs only covered 10 per cent of operating costs. As a result, water rationing and shortages are common in Algeria.

Algeria decided important institutional reforms were necessary in 2001; the process has been accelerated by the exceptional drought in Algiers in 2002. Water treatment, supply and sanitation have been reorganised as part of the reforms. These operations depend now on four public agencies and the territory is divided into five regional basins:

The “Agence nationale des barrages” (ANB), the National Agency for Dams, is in charge of the construction of dams, reservoirs, pumping and water treatment stations and connection pipes.

The ADE, created in 2001, is legally independent and has financial autonomy. It is in charge of 26 public water operators in the most urban areas of the country. The ADE is also in charge of five regional agencies, one for each basin. Each regional agency is subdivided into geographic zones and each zone into functional units. For example, the regional agency of Algiers is subdivided into four zones: Algiers, Setif, Tizi Ouzou and Medea. There are three units in the zone of Algiers: production, supply and management.

The “Office National d'Assainissement” (ONA) (National Bureau for Wastewater) was also established in 2001 after it was found that there was a complete lack of interest in the matter of waste water management within the government. This led to damage to the environment and to wasting a resource that could be re-used. An important task of the ONA is to develop a policy of re-utilisation of treated wastewater.

The Agence Nationale de Realisation et de Gestion des Infrastructures Hydrauliques pour l'Irrigation et le Drainage (AGID) is in charge of irrigation and drainage.

In order to rationalise and centralise the management of water, these four entities ANB, ADE, ONA and AGID will be combined under a single agency in the future.

In 2005, Algeria further pursued its effort in reforming the water sector and implemented an ambitious water law. This new code emphasises private sector participation in water and encourages public water and sewerage services to delegate their activities under a concession contract. Service contracts, management contracts, lease contracts and concession contracts were legalised as early as 1995 in the Water Code (Code de l'Eau). However, so far concession contracts have not been used. This might be due to the lack of political reforms before 2001. The institutional framework is now well defined and concession contracts should be awarded in the coming years.

The new law proposes also that municipalities create and delegate water supply to financially independent public operators (“régie publique”). Corporatisation is essential to increase efficiency of public operators and to promote true competition between public and private provision of water.

In addition, article 65 of the law of 2005 calls for an independent regulatory agency in charge of monitoring public and private water provision and setting tariffs. The final decision for creating a regulatory agency still needs to be approved in a specific law. Such a decision would strengthen the institutional framework, lower financial risks in the sector and thus contribute to attract private investors.

The recent reform also concerns water tariffs. There used to be a flat fee for water supply, but this system is being abandoned. The law of 2005 proposes a new progressive tariff system (Table 4.3). Users can now choose between a flat fee, which is set rather high,

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and a bill against a metered supply. Although users are not obliged formally to accept a water meter, the fixed fee has been increased strongly to a level at which it is advantageous for virtually all users to have a water meter installed. The aim of this, among others, is to reduce demand. In practice, the first 25 cubic metres per trimester are sold at a low rate (DZD 3-4 per m<sup>3</sup>) but higher consumption is charged at higher prices. Tariffs vary according to the territorial zone and cover the actual costs of renovating and expanding potable water infrastructures.

**Table 4.3: Tariff of water supply in Algeria in 2007 in Algerian Dinars (DZD) per m<sup>3</sup>**

	0-25 m <sup>3</sup> per quarter	26-55 m <sup>3</sup> per quarter	56-82 m <sup>3</sup> per quarter	more than 83 m <sup>3</sup> per quarter
Biskra, Djelfa, El Oued, Ghardaia, M'Sila, Tébessa	3.6	11.7	19.8	23.4
Ain Defla, Mostaganem, Oran, Relizane, Tipaza	3.6	11.7	19.8	23.4
Batna, Constantine, Jijel, Khenchela, Mila, Sétif	3.6	11.7	19.8	23.4
Béchar, El Bayadh, Naâma	3.6	11.7	19.8	23.4
Alger, Blida, Boumerdès	3.8	12.35	20.9	24.7
Annaba, El Tarf, Guelma, Oum El Bouaghi, Skikda, Souk Ahras	3.6	11.7	19.8	23.4
Adrar, Laghouat, Ouargla, Tiaret	3.7	12.025	20.35	24.05
Ain Témouchent, Mascara, Saida, Sidi Bel Abbès, Tlemcen	4	13	22	26
Béjaia, Bouira, Bordj Bou Arréridj, Chlef, Médea, Tissemsilet, Tizi Ouzou	4.3	13.975	23.65	27.95
Illizi, Tamenrasset, Tindouf	4.5	14.625	24.75	29.25

*Source:* Ministère des Ressources en Eau d'Algerie, February 2007.

Combating water losses is also considered a priority action; the aim is to reduce water losses to 25 per cent. Therefore, 11 cities are being addressed under an Unaccounted for Water (UfW) programme. The emphasis is put on water metering; ADE announced in July 2003 that it would install 190 000 water meters.

Lastly, the code gives the government more power to regulate water quality and protect areas with vulnerable ecosystems. It specifies penalties for breaking environmental regulations and calls for the creation of a "water police" to enforce them.

### C. Recent reforms in Egypt

Water is a fundamental issue for Egypt. Indeed, 95 per cent of its water comes from the River Nile and Egypt has to share this resource with nine other states living upstream (the 10 countries of the Nile Basin include Burundi, Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda). Moreover, Egypt is the country that has the largest consumption of the reserve. These circumstances engender political tensions in the region. In addition, water stress, over withdrawal problems, high urban population growth and uncertain impact of climate change make this situation particularly concerning.

Municipal water supply and sanitary services are carried out by a set of economic authorities affiliated with the Ministry of Housing, Utilities and New Communities (MHUNC). Under MHUNC, the National Organization for Potable Water and Sanitary Drainage (NOPWASD) is responsible for planning, design and construction of municipal



drinking water purification plants; distribution systems; sewage collection systems and municipal wastewater treatment plants throughout Egypt with the exception of some urban areas. The NOPWASD is responsible outside of Cairo, Alexandria and the Suez Canal cities. For Cairo, Alexandria and the Suez Canal area, the responsibility is respectively on the General Organization for Sanitary Drainage in Cairo (GOSDC), the General Organization for Greater Cairo Water Supply (GOGCWS), the Alexandria General Organization for Sanitary Drainage (AGOSD), the Alexandria Water General Authority (AWGA) and the Suez Canal Authority.

Operational and maintenance responsibilities are delegated to local agencies, which are classified into economic/general authorities and public/private companies or utilities in nine Governorates (with private companies for wastewater treatment in Damietta, Kafr El Sheikh and Beheira). A central organisation, the General Authority for Potable Water and Sanitary Drainage (GAPWSD) supervise these governorate entities.

In 2004, Egypt decided to rationalise the organisation of the public water sector and centralise all water activities. The presidential decree 135 for 2004 regroups all drinking water and sanitation entities of the country under one single holding company. The company counts 70 000 public workers and its debt is estimated at 13.8 billion Egyptian Pounds (EGP). Thus, its first mission is to seek new financial resources to sustain the operation and management budget and to relief the burden on the government.

Anticipating private sector participation and a possible privatisation of the holding company in the coming years, the government has also created a regulatory agency, the "Central Authority for the Drinking Water and Sanitation Sector, and Protection of the Consumer" (Presidential Decree, 136 for 2004). This regulatory agency reports to the Minister of Housing, Utilities and Urban Communities, and is the liaison body between the government, the society and the holding company to ensure that national policies and regulations are followed. However, this newly created regulatory agency is not autonomous. Indeed, the Minister of Housing heads the Governing Board and the Ministries of Finance, Health and Population and of the Environment are also represented on the governing board.

Concerning the financing of water, almost 90 per cent of the development, operation and maintenance costs of water services in Egypt are currently funded by public sources. Primary financing of the water sector comes only through three principal sources: sovereign sources and general-tax system, agricultural user-fees and municipal and industrial user-fees.

The lack of financing reforms is a concern since costs have increased significantly. The expenses for drinking water and sanitation grew from EGP 4.73 billion in 1997/98 to EGP 8.45 billion in 2003/04. During the period 1982-2004, EGP 25.0 billion have been spent for potable water supply services and EGP 40 billion have been invested in sanitation services. According to the Ministry of Water Resources and Irrigation (World Bank, 2005b), the costs for water services for the next 15 years will be more than triple that of the current expenditures. Future allocation of such high costs presents a heavy burden for the state budget. Alternative scenarios for financial sustainability of the water sector need to be addressed.

Moreover, revenues cover only 40 per cent of costs because of subsidies, inefficiency, high levels of leakage and non-paying state customers (Pinsent Masons, 2006). The tariff system has not been reformed and prices are set very low: EGP 0.30/m<sup>3</sup> for domestic use in

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Cairo (Ambassade de France en Egypte, 2005). Cost recovery problems and low tariffs discourage financial investors and private sector participation.

In addition to that, there is an important problem of centralisation in tariff setting. In theory, tariffs are set in accordance with local authorities. However, in practice, water supply administration in Egypt is centralised; local governments have neither technical competences nor budgets to manage water services.

#### **D. Decentralisation and concession contracts in Morocco**

In Morocco, the amount of renewable freshwater available per inhabitant stands just below the scarcity line with 964.4 cubic metres per capita. Because of drought and population growth, several studies predict that the amount of renewable freshwater per inhabitant would drop to 500 cubic metres per capita (Ambassade de France au Maroc, 2005).

All major population centres in Morocco have central water supply systems consisting of reservoirs, treatment works and distribution networks. However, many of these are in a poor state of repair. Until recently, an estimated 40 per cent of water was lost through leakage and other problems (ABS Energy Research, 2006). In rural areas, where 42 per cent of the population lives (Table 2.2), only 56 per cent have access to improved water source (WHO/UNICEF, 2004). Wastewater and sewerage systems have not been developed as widely as the water supply systems. Respectively, 83 per cent and 31 per cent of urban and rural population has access to improved sanitation facilities (Office National de l'eau potable, 2007). Sewage systems exist in most large- and medium-sized cities; however, they are often inadequate. In most parts of the country, wastewater is disposed directly into rivers or the sea. Some major cities have no wastewater treatment systems at all. Thus, water supply and sanitation are considered by the Moroccan government as a strategic issue for development.

Contrary to the high level of centralisation of the Moroccan state, water administration is relatively more decentralised and specialised by function:

- The Directorate General of Hydraulics plans and develops water resources.
- The nine Regional Authorities for Agricultural Development (RAADs) develop and maintain water distribution networks, acquire and distribute water, collect water charges and provide farm inputs and extension services.
- The National Office of Potable Water (ONEP), created in 1972, acquires and distributes water on a retail basis to households and industries and on a bulk supply basis to municipal/provincial governments. As in Tunisia, the National Office of Potable Water is legally and financially independent. It no longer receives subsidies, and is now developing the capacity to finance itself, in addition to which it can borrow to finance system extensions and renovations. It is the major water producer and distributes water to 416 urban centres, 3 656 "Douars" and 198 small rural centres.

The new Water Code of 1995 has led to significant changes. It has created River Basin Organisations, covering one or more RAADs, as nodal agencies for water administration at the regional level. As the ONEP, these River Basin Organisations are legally and financially independent. Their mission and financing mechanism is very similar to French Basin Agencies. They are financed through users' fees ("redevance") and they can lend money for different local investment programmes in water. The first River Basin Organisations were created in 1997.

In 2002, The Moroccan government pursued the decentralisation movement by giving to municipalities the full responsibility of water supply and sanitation services. Therefore, municipalities have four options:

- they can manage directly water services;
- they can create an independent public provider and delegate the management of water services;
- they can also delegate the management of water services to the ONEP;
- they can delegate the management of water services to private firms.

Thus, the country counts 13 independent public operators (“regie”) and 4 private operators under a concession contract. The first concession, for Casablanca, was awarded in 1997 to Lydec (Suez), by direct negotiation. The second concession, for the capital, Rabat, was awarded in 1999 to Redal (Veolia), also by direct negotiation. However, with time the process evolved to become more transparent, involving public tendering. This procedure resulted in concessions being awarded to Amendis (Veolia) for two other major cities (Tangiers and Tetouan) in 2002.

**Table 4.4: Tariff of water supply in some Moroccan cities in 2007 in Dirham per m<sup>3</sup>**

		0-6 m3 per month	6-20 m3 per month	20-40 m3 per month	over 40 m3 per month
ONEP (Public)	El Jadida	3.09	7.78	11.86	11.91
	Agadir	2.95	7.77	9.58	9.63
	Safi	3.32	7.88	13.12	13.17
	Marrakech	1.70	6.37	9.36	9.41
	Oujda	3.81	10.11	14.72	14.77
	Fes	1.95	7.07	8.79	8.84
	Nador	2.13	6.01	8.51	8.56
	Settat	2.63	6.86	7.53	7.58
	B.Mellal	2.61	6.51	10.14	10.19
	Kenitra	2.32	5.25	6.59	6.64
	Larache	1.74	5.31	6.06	6.11
	Meknes	1.30	3.88	4.45	4.51
	Taza	2.15	6.00	8.92	8.97
LYDEC (Private)	Casablanca	2.92	9.69	13.20	13.25
	Mohammedia	2.53	8.15	11.68	11.73

Source: ONEP and LYDEC, March 2007.

Morocco is the only country of the Mediterranean region that has introduced concession contracts for water supply. After a few years of operation, the results of the first concession in Casablanca are relatively satisfying. The private operator has made major investments; between 1997 and 2002 the number of people served increased from 440,000 to 590,000; and unaccounted for water dropped from 38.9 per cent to 27.7 per cent, while it is about 25 per cent in cities managed by the ONEP (ONEP, 2007). However, tariffs have

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increased by 20 per cent over this period and are slightly higher than those applied in other cities where water is managed by the ONEP (Table 4.4).

As in other Mediterranean countries, Morocco has adopted a progressive tariff structure. The definition of the block system is set nationally for both private and public suppliers. However, the price of a cubic metre of water within each block is set locally and tends to reflect, in some form, the effective cost of water, as it is emphasised in the water law of 1995.

## **E. Private sector participation in Jordan**

Jordan is facing a future of very limited water resources; it has among the lowest level of water in the world on a per capita basis (165.1 m<sup>3</sup>/inhabitant/year). Water scarcity is the single most important natural constraint to Jordan's economic growth and development. Jordan's water resources consist primarily of surface and ground water and for several years now, renewable ground water resources have been withdrawn at an unsustainable rate in order to meet the increasing demand. In addition, surface and ground water quality in some areas is deteriorating.

Despite scarcity, water use is not efficient: unaccounted for water reaches 47 per cent in the Amman region (GTZ, 2006). Agriculture uses more than 60 per cent of water resources, while it contributes only 2.8 per cent to GDP (Table 2.1). Connection rates to the municipal network are high, at more than 90 per cent, but water supply is intermittent.

The institutional framework of the water supply sector in Jordan consists in four entities: the Ministry of Water and Irrigation (MWI), the Water Authority of Jordan (WAJ), the Programme Management Unit (PMU) and the Jordan Valley Authority (JVA).

The MWI was established in 1992 in response to the need for an integrated approach to national water management. It is the official body responsible for the formulation of national water strategies and policies, the monitoring of the water sector, planning and management and procurement of financial resources.

The WAJ and the PMU carry out regulatory tasks. The WAJ was established in 1983 as an autonomous centralised corporate body, with financial and administrative independence linked with Minister of Water and Irrigation. WAJ is fully responsible for public water supply and wastewater services, as well as for water resources planning and monitoring, construction, operations and maintenance.

The PMU was established within the WAJ in 1996. It carries out the responsibility for regulating water supply and wastewater utilities under private management. The PMU operates under the supervisory control of an Executive Management Board, which is headed by the Minister.

The JVA was founded in 1973. It is responsible for the development and utilisation of water resources in the Jordan Valley for irrigated farming, municipal, industrial and tourism purposes. The JVA is also responsible for the dams and reservoirs in the country.

The existing organisational structure does not show clear separations between political, strategic, regulatory and operational tasks. The management of the water sector is centralised and political interference is usual. Autonomous water agencies are headed by the Minister and are thus not independent. Regulatory functions remain limited to the monitoring of the water sector.

Due to the increase in water demand, the MWI adopted, in 1997, a water strategy emphasising the need to give a major role to the private sector. Thus, the government decided, in 1999, to contract out the operation and management of water and wastewater services in Amman to the Lema consortium (Ondeo, Montgomery Watson and Arab-tech). The contract term was initially five years but was extended until December 2006.

While service provision is still not satisfactory, private sector participation in Amman resulted in significant improvements in water supply: tariffs did not particularly increase, the workforce decreased by 400 staff and the duration of supply increased from 36 hours per week at the start of the contract to an average of 75 hours per week in 2004 (LEMA, 2006).

After a transition period, the management of water supply of Amman was handed over to the state and transferred in July 2007 to a corporatised public entity, Miyahuna. In the future, further BOT contracts, as well local private sector participation are expected.

Finally, the major problem of the Jordanian water sector resides in the inefficient pricing policy. The water charges are set locally by the MWI. Jordan has adopted a well-defined, progressive tariff structure with subsidies for the poorest communities. However, prices are set too low to be sustainable and disparities among users are too important. The amount paid for water in the Jordan Valley is very low compared to the urban and industrial water tariffs. The average JVA tariff billed in 2000 was USD 0.008/m<sup>3</sup>, while the average 2001 urban water tariff in Jordan was 90 times greater or USD 0.54/m<sup>3</sup> and industrial and non-residential water users were charged USD 1.42/m<sup>3</sup> (World Bank, 2004).

## VI. WATER SECTOR ANALYSIS SCORECARD

### A. Determinants of the scorecard

The purpose of the Water Sector Analysis Scorecard, developed in this part of the study, is to understand the scope of water related issues, to monitor institutional reforms in the water sector and to assess the future of private sector participation in the water sector. The scorecard is based on 10 dimensions and 49 indicators.

The 10 dimensions, presented in the scorecard, are the water resource (1), the water use (2), the management of water (3), the water pricing policy (4), the water institutional framework (5), the private sector participation in water supply (6), the desalination (7), the projected investments in water and wastewater services (8), the demography (9) and the economic and business conditions (10).

The first three dimensions of the scorecard describe problems of water resource (1) use (2) and management (3). The question of management of water supply is not necessarily linked with water resource and use. However, water scarcity (1.1), over withdrawal practices (1.2) and foreign dependency (1.3) can emphasise the importance of water supply problems.

Moreover, in arid countries the allocation of water between different users: agriculture (2.1), domestic (2.2) and industry (2.3) is also to be taken into account.

Managing access to water in urban areas is usually illustrated by the percentage of population with safe access to water (3.1). While this information is useful, it cannot give a complete outlook of the situation. In order to evaluate better the quality of water management in the country, the scorecard also includes five other variables: the percentage of population with a household connection to water (3.2), the continuity of water supply (3.3), the number of hours of access to tap water (3.4), an estimate of unaccounted for water (3.5) and the operating cost coverage ratio (3.6).

The pricing policy of water is the fourth component of the scorecard (4). An efficient water pricing policy needs to assess the differences of cost of water from one region to another. Water charges are not equal in arid areas and in cities; prices need to be set in consequence. Tariffs need to be set locally (4.1). However, it is essential to keep water affordable for everyone. According to most experiences of tariff reform in the world, one of the easiest ways to subsidise water for the poorest seems to be through a progressive block tariff structure (4.2). Prices of water are displayed in (4.3) and (4.4). Nevertheless, tariffs need to be set at a level viable enough to keep operations running and finance the capital (4.5). Water charges need also to take into account the individual consumption; individual water metering is essential (4.6). Water metering annual equipment rate is presented in (4.7).

The fifth dimension is the institutional framework (5). As discussed previously in the study, without adequate institutional arrangements, delegating water services to private operators do not necessarily improve efficiency. Thus, the design of a regulatory system is the most essential step in the process of reforming the water sector. The first two elements of

this issue concern the presence of a regulatory agency (5.1) and its effective independence (5.2). An independent regulatory agency is a valuable tool, which provides political stability and safe economic environment for both private and public water operators. Often countries create an autonomous water regulatory agency. However, in practice these agencies are rarely independent from governments and are thus not very useful. The third component is the separation of powers (5.3). As in a corporate environment, the separation of roles—political, strategic, regulatory and operational—is a condition of efficient management. Another important reform is the corporatisation of local water operators (5.4). Establishing legal and financial independence of water operators reduces administrative burden and political interference. It guarantees the transparency of costs and financial flows. It also ensures a fair and fruitful competition among water operators, public or private. The last two indicators of the institutional framework concern the decentralisation of the public administration of water. Countries can create river basin organisations (5.5), which are funded through users' fees and aim to finance local water projects. Thus, part of the public responsibility is delegated to the regional level, which is able to evaluate needs more precisely. This system also reduces the fiscal and administrative burden of the central state. Without creating basin agencies, the administrative burden can also be moderated by decentralising parts of water policy to regions (5.6).

The sixth dimension is the involvement of the private sector in water supply (6). Introducing private sector participation in a well-defined, institutional environment and establishing a reasonable level of competition between the public and private water sector can improve management efficiency. In order to evaluate properly the scope of private sector participation, the six sub-indicators presented in this section are: the presence of private water operators in the country (6.1), an estimate of the percentage of population delivered by the private sector (6.2), the location of private contracts (6.3), the types of contracts (6.4), the year of introduction of private sector participation in the country (6.5) and an estimate of additional population to be served by the private sector by 2015 (6.6).

The seventh component of the scorecard is the development of the desalination market. With escalating demand for water, desalination is expected to increase in the Mediterranean region. It will lead to an increase of private sector participation in water through BOT contracts. The scorecard presents, successively, the current and planned capacity of desalination (7.1), the expected total capacity by 2015 (7.2), capital cost (7.3) and operating cost by 2015 (7.4).

The eighth dimension of the scorecard is the projected investments in water and wastewater services. In order to face important water investment costs in the near future, countries will need to tap the private capital market. Forecasted potable water and wastewater investments by 2015 are presented in value (8.1 and 8.2) and as a percentage of the GDP (8.3, 8.4 and 8.5).

The ninth and tenth components of the scorecard, the demography (9) and the economic and business environment (10), are not specific to the water sector. However, the evolution of the demography provides a good estimation of the water market growth and the analysis of national economic and business conditions allow better assessments of the potential for private sector participation in the water sector. For the demographic component, the sub-indicators are population growth (9.1), urban population growth (9.2) and the percentage of urban population in 2005 (9.3) and the projected percentage of urban population in 2015 (9.4). The economic and business conditions are analysed in five sub-

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indicators published by the World Bank in “Doing Business in 2007”. The first one is the Ease of Doing Business Rank (10.1). Then, the legal rights index (10.2) measures the degree to which laws protect the rights of borrowers and lenders and thus facilitate lending; the index ranges from 0 to 10, with higher scores indicating that laws are better designed to expand access to credit. The third one is an investor protection index (10.3), the index ranges from 0 to 10, with higher values indicating better investor protection. The fourth one is the time for enforcing contracts (10.4) and the last one is the scope of the informal economy (10.5) as a percentage of the Gross National Product.

Lastly, an assessment is proposed (11) on the development (11.1) and possible forms (11.2) of private sector participation in the water sector in the near and medium term. This judgment is based on the analysis for each country of the water resource (1), the water use (2), the management of water (3), the pricing policy (4), the institutional framework (5), the current private sector participation (6), the desalination market (7), the projected investments (8), the demography (9) and the economic and business conditions (10).



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### B. Water Sector Analysis Scorecard for countries of the Mediterranean region

Indicators	Sub-Indicators	Algeria	Egypt	Jordan	Morocco	Tunisia	Source of data
1. Water resource	1.1. Water scarcity (Total renewable freshwater per capita)	373.2 m3/inhab/year	826.9 m3/inhab/year	165.1 m3/inhab/year	964.4 m3/inhab/year	472.3 m3/inhab/year	FAO / World Resources Institute for the last year available 2000
	1.2. Over withdrawal (Total water withdrawal as percentage of total renewable water resources)	52.03%	117.20%	114.80%	43.45%	57.45%	
	1.3. Foreign dependency ratio (percentage of total renewable water resources originating outside the country)	3.60%	96.91%	22.73%	0.00%	8.71%	
2. Water use	2.1. Agriculture withdrawal	65%	78%	75%	87%	82%	
	2.2 Domestic withdrawal	22%	8%	21%	10%	14%	
	2.3. Industry withdrawal	13%	14%	4%	3%	4%	

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Indicators	Sub-Indicators	Algeria	Egypt	Jordan	Morocco	Tunisia	Source of data
3. Water management	3.1. Improved Drinking Water Coverage in Urban Areas (Total)	88%	99%	99%	99%	99%	WHO-UNICEF 2004
	3.2. Improved Drinking Water Coverage in Urban Areas (Household Connection)	85%	99%	96%	86%	94%	
	3.3 Continuous water supply	No	No	No	Yes	Yes	Algeria: Press release and World Bank 2007; Jordan: GTZ 2006; Morocco: World Bank 2007; Tunisia: World Bank 2007.
	3.4. Average hours of access to tap water (hours/day)	12 hours in Algiers	12 hours	12 hours	24 hours	24 hours	World Bank 2007
	3.5. Estimate of unaccounted for water	40%	50% in Alexandria and Cairo	47% in Amman	Around 25-30%	Around 20%	Algeria: ABS Research 2006; Egypt: World Bank 2005c; Tunisia: World Bank 2005a; Jordan: GTZ 2006; Morocco: ONEP 2006, Lydec 2006.
	3.6. Operating cost coverage ratio	82%	40%	70%	110% in Casablanca and Rabat	87%	Algeria: Ibnet; Egypt: Pinsent Masons 2006; Jordan: Stone and Webster 2004; Morocco: World Bank 2006; Tunisia: World Bank 2005a.

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Indicators	Sub-Indicators	Algeria	Egypt	Jordan	Morocco	Tunisia	Source of data	
4. Water pricing policy	4.1. Geographical tariff setting	Tariff set locally	Tariff set locally	Tariff set locally	Tariff set locally	Tariff set nationally	Institutional communication	
	4.2. Progressive tariff structure	Yes	Yes	Yes	Yes	Yes		
	4.3. Price of domestic water in the lowest block tariff category in 2006-2007	Between 0.050 \$/m <sup>3</sup> and 0.062\$/m <sup>3</sup>	0.040 \$/m <sup>3</sup> in Cairo	0.14 \$/m <sup>3</sup> on average in Amman	Between 0.155 \$/m <sup>3</sup> and 0.454\$/m <sup>3</sup>	0.109 \$/m <sup>3</sup>	Algeria: Ministère des Ressources en Eau d'Algerie 2007; Egypt: AfDB Expert 2006; Morocco: LYDEC and ONEP 2007; Tunisia: SONEDE 2007	
	4.4. Price of domestic water in the highest block tariff category in 2006-2007	Between 0.327 \$/m <sup>3</sup> and 0.409 \$/m <sup>3</sup>	0.122 \$/m <sup>3</sup> in Cairo		Between 0.537 \$/m <sup>3</sup> and 1.76 \$/m <sup>3</sup>	0.652 \$/m <sup>3</sup>		
	4.5. Sustainable level	No. But tariff reform is on track, prices increased in 2005	No	No, extreme subsidies of water for agricultural use.	Yes	Yes overall, but the high level of cross subsidies does not seem sustainable.		Institutional communication
	4.6. Metering practice	Yes	Yes	Yes	Yes	Yes		
	4.7. Metering annual equipment rate estimate (average number of water meters installed and to be installed annually between 2005-2010 per thousand inhabitants and per year)	0.86	0.86	9.30	0.80	0.84	Author's calculation based on estimates by ABS Energy Research in 2006	

Indicators	Sub-Indicators	Algeria	Egypt	Jordan	Morocco	Tunisia	Source of data
5. Water institutional framework	5.1. Presence of regulatory agency	Not yet. However, it has been planned in the article 65 of the new water law of 2005	Yes, since the Presidential Decree 136 of 2004	Yes (Water Authority of Jordan and Programme Management Unit)	No	No	Official communication, laws and decrees.
	5.2. Real independence of the regulatory agency		No, agency headed by several Ministers	No, agency headed by the Minister of Water and Irrigation			
	5.3. Separation of powers	Yes	Important political interferences	Important political interferences	Yes	Some political interferences	
	5.4. Corporatisation of local operators	Possible since 2005	Yes, since the Presidential Decree 135 of 2004	Yes, launch of Miyahuna in 2007	Possible since 2002	No	
	5.5. Basin Organisations	No	No	No	Yes since 1997	No	
	5.6. Centralisation versus decentralisation	Relatively more decentralised.	Decisions are centralised. Decentralisation process should be on track in the coming years.	Centralised	Relatively more decentralised.	Centralised	

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Indicators	Sub-Indicators	Algeria	Egypt	Jordan	Morocco	Tunisia	Source of data
6.Private sector participation in drinking water*	6.1. Presence of private operators	Yes	No	Yes	Yes	No	Institutional communication and press releases (Excludes service contracts)
	6.2. Estimate of the percentage of population delivered by the private sector	Between 10% and 20%		Around 40%	Between 20% and 30%		
	6.3. Location	Algiers, Taksbet, Athmania, Arzew, Bredeah, Beni Haroun.		Amman	Rabat, Casablanca, Tetouan and Tangiers.		
	6.4. Types of contract	Management contract and BOT		Management contract and BOT	Concession contracts and BOT		
	6.5. Year of introduction of private sector participation	2001 (legalised in 1995, first management contract in 2005)		1999	1997		
	6.6. Additional population to be served by the private sector by 2015	NA	5 290 500	880 970	3 197 400	1 002 600	Calculation based on Pinsent Masons estimates (2006) and on UN population estimates

\*As of December 2006

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Indicators	Sub-Indicators	Algeria	Egypt	Jordan	Morocco	Tunisia	Source of data
7.Desalination market	7.1. Current and planned capacity	886 000 m3/day	305 000 m3/day	50 000 m3/day	125 000 m3/day	60 000 m3/day	Global Water Intelligence Desalination Markets 2005 – 2015 In Global Water Intelligence Volume 5
	7.2. Expected total capacity by 2015	2 000 000 m3/day	410 000 m3/day	500 000 m3/day	200 000 m3/day	150 000 m3/day	
	7.3. Capital cost by 2015	\$2 520 million	\$369 million	\$350 million	\$270 million	\$135 million	
	7.4. Operating cost by 2015	\$491 million	\$72 million	\$69 million	\$53 million	\$22 million	
8. Projected investments in water and wastewater services	8.1. Forecasted potable water investments between 2005 and 2015	\$8 630 million	\$7 270 million	\$910 million	\$4 090 million	\$455 million	Estimates by Global Water Intelligence in Gulf Capital (2006)
	8.2. Forecasted wastewater investments between 2005 and 2015	\$1 360 million	\$5 900 million	\$455 million	\$2 725 million	\$680 million	
	8.3. Average annual potable water investments between 2005 and 2015 as a percentage of the 2006 GDP	0.94%	0.86%	0.65%	0.72%	0.14%	Author's calculation based on estimates by Global Water Intelligence in Gulf Capital (2006)
	8.4. Average annual wastewater investments between 2005 and 2015 as a percentage of the 2006 GDP	0.15%	0.70%	0.32%	0.48%	0.21%	
	8.5. Average annual potable water and wastewater investments between 2005 and 2015 as a percentage of the 2006 GDP	1.08%	1.56%	0.97%	1.20%	0.34%	

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Indicators	Sub-Indicators	Algeria	Egypt	Jordan	Morocco	Tunisia	Source of data
9. Demography	9.1. Population growth 2005-2015	15.9%	19.1%	22.0%	14.8%	10.3%	UN population estimates
	9.2. Urban population growth 2005-2015	26.2%	26.4%	24.7%	26.6%	16.6%	
	9.3. Urban population in 2005	60.0%	42.3%	79.3%	58.8%	64.4%	
	9.4. Urban population in 2015	65.3%	44.9%	81.1%	64.8%	68.1%	
10. Economic and business environment	10.1. Ease of Doing Business Rank	116	165	78	115	80	Doing Business In 2007. World Bank and IFC
	10.2. Legal Right Index	3	1	5	3	3	
	10.3. Investor Protection Index	5.3	4.3	4.3	4.3	3.3	
	10.4. Time for enforcing contracts	397 days	1010 days	342 days	615 days	481 days	
	10.5. Informal economy estimate (% GNP)	34.1%	35.1%	19.4%	36.4%	38.4%	

Indicators	Sub-Indicators	Algeria	Egypt	Jordan	Morocco	Tunisia	Source of data
11. Future of private sector participation in water supply	11.1. Development of private sector participation in water supply in the near and medium term	Very strong development in the near term.	Moderate development in the near term. Stronger in the medium long term.	Moderate development.	Strong development.	Moderate development.	Author's assessment based on the analysis of water resource, water use, water management, pricing policy, institutional framework, current private sector participation, desalination market, projected investments, demography and economic and business environment.
	11.2. Forms of private sector participation	BOT desalination contracts and management contracts in the near term. Concession contracts in the medium term.	BOT and service contracts in the near term.	BOT and management contracts.	BOT and concession contracts.	BOT and service contracts.	

NB. \$ refer to USD

Source: Water Sector Analysis Scorecard. Edouard Pérard, 2007.



## VII. MAIN RECOMMENDATIONS: INSTITUTIONAL REFORMS AND FUTURE OF PRIVATE SECTOR PARTICIPATION IN WATER SUPPLY

### A. Tunisia

With only 472.3 cubic metres of water per inhabitant per year, Tunisia is a very water scarce country. In such an arid land, the question of the allocation of water between different users will certainly need to be addressed in the short term. Indeed, 82 per cent of water is used for agriculture, while this sector contributes to 12.6 per cent of the GDP of the country.

The national Tunisian water operator, SONEDE, is very efficient in comparison with others in Mediterranean countries. It boasts a drinking water household connection rate of 94 per cent in urban areas, continuous water supply and an unaccounted for water ratio of 18 per cent, which is in line with OECD countries. This good performance is due to the strong commitment of the Tunisian government for more than thirty years. Nevertheless, the operating cost coverage ratio has deteriorated for several years and stands at 87 per cent.

Two areas of improvement lie in tariff setting policy and in institutional arrangements. Prices of the first blocks of consumption are set very low, while prices for large consumers are particularly high. About 3 per cent of SONEDE clients generate 65 per cent of the revenue. This pricing policy is not sustainable in the long term; important customers could switch to independent private operating systems. Moderate increases to the prices of the first blocks of consumption seem unavoidable; it would improve the operating cost coverage ratio and secure SONEDE's financial future. The second tariff reform concerns the geographical setting policy; Tunisia is the only country of the region, which applies one uniform tariff to the all state. An efficient pricing policy would take into account local differences of the cost for providing services. These two reforms should be carried out in the near term.

The second area of improvement is the institutional framework. In Tunisia, the governance of water is centralised and political interferences are usual. In the long term, the organisation of the sector could be improved by decentralising the management of water and corporatising local operators.

In the near and medium term, private sector participation is expected to increase moderately. Even if the general economic and business environment is favourable, current institutional arrangements are not particularly suitable to an important development of private sector participation in water supply. Moreover, urban population growth (expected to be over 16 per cent during the next 10 years) is under control and the relative good performance of SONEDE does not push toward delegating water supply services to others.

However, it is expected that Tunisia will more than double its desalination capacity. To face the USD 135 million projected investments, the country will need to tap private finance

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capital. It is very likely that desalination treatment will be outsourced as BOT contracts. In addition, private sector participation will also continue in wastewater under service contracts.

## **B. Algeria**

Algeria is the most arid country of North Africa with 373.2 cubic metres of water per inhabitant per year. Thus, the consumption of water by the agricultural sector is less important than it is in other countries of the region. However, it still represents two-thirds of total freshwater available for a contribution to the GDP of less than 10 per cent, while the industrial sector withdraws 14 per cent of freshwater and contributes to more than 56 per cent of the GDP. In the medium term, it is probable, that agricultural consumption will naturally decrease in favour of the industrial consumption, as is the case in OECD countries.

The overall performance of water supply in Algeria is low. The household connection rate is only 85 per cent in urban areas; water shortages and rationing are common. The unaccounted for water ratio reaches 40 per cent. This situation is due to the lack of political concern and investments for more than twenty years, until 2001, when Algeria started important institutional reform. The country pursued its effort and implemented an ambitious water law in 2005. The governance of water is relatively decentralised, local operators can now be corporatised and political interferences are being reduced.

The price of water is too low to be sustainable, but the tariff reform is on track. On the positive side, the tariff structure is progressive and is set locally. In addition, the metering practice is expanding.

The private sector provides water to more than 10 per cent of the population. The first management contract was awarded for the water supply of Algiers in 2005. In the near term, it is expected that private sector participation will increase at a significant pace. Three combined factors can explain this anticipation: investment needs for renewing water infrastructures are particularly important (USD 8 630 million over 10 years); as detailed previously, the institutional framework is well adapted to private sector participation; and lastly, urban population is expected to increase drastically (by 26.2 per cent) over the next 10 years. The economic and business environment could of course be improved, but the level of protection of investors is correct.

In the near term, possible forms of private involvement are management contracts as in Algiers and BOT contracts for desalination treatment since desalination capacity is expected to double by 2015 and to cost more than USD 2 500 million. In the medium term, if the experience with management contracts is positive, it is very likely that Algeria will opt for a higher degree of private sector participation with concession contracts as in Morocco.

## **C. Egypt**

With 826.9 cubic metres of water per inhabitant per year, Egypt is a water stressed country; it faces over withdrawal problems and foreign dependency (95 per cent of water comes from the Nile River). Considering these elements, the repartition of water among users in favour of the agriculture sector (78 per cent) does not seem sustainable in the long term.

Besides the high connection rate in urban areas, the performance of water management is relatively poor. Water supply is discontinuous (about 12 hours per day), unaccounted for water is very high (50 per cent in Alexandria and Cairo) and the operating cost coverage ratio is very low (40 per cent).

The two areas of improvement are pricing policy and institutional reform.

Egypt has adopted a progressive tariff structure; however, prices of all blocks of consumption are too low to be sustainable. This issue needs to be addressed in the very short term. Nevertheless, any potential increase of water tariffs to a viable level is limited by the strong opposition of the population.

Some progress could also be made by reforming the institutional framework. Water governance in Egypt is characterised by a high level of political interference and centralised planning. The decentralisation process is on track, but takes time to be implemented. The corporatisation of more local operators would constitute an important step.

Current institutional arrangements do not seem to be favourable to the development of private sector participation in water supply. Thus, in the near term, without significant institutional reforms, it is likely that private involvement in water supply will be limited to BOT and service contracts.

#### D. Morocco

Morocco is just below the limit of water stressed situation (964.4 cubic metres of water per inhabitant per year); the country holds twice more water per inhabitant than Algeria and Tunisia. Agriculture contributes to 15.9 per cent of the GDP, but it uses 87 per cent of water, leaving only 3 per cent to industry, which contributes to 30.4 per cent of the GDP. The allocation of water will need to be reformed in the long term.

The performance of water supply is relatively good as 99 per cent of people have access to improved drinking water in urban areas. However, 14 per cent of them do not have household connections. Water is supplied continuously and the unaccounted for water is at a reasonable level, about 25-30 per cent. Moreover, Morocco is the only country of the Middle East and North African region, which covers operational cost of delivering water (World Bank, 2007). The operating cost coverage ratio is of 110 per cent in Rabat and Casablanca. Indeed, the price of water is much higher in Moroccan cities than in other cities of North Africa.

The reorganisation of the water supply sector in Morocco started ten years ago, the institutional framework is now well defined. The governance of water has been relatively decentralised, some local operators have been corporatised and political interferences are being reduced. Basin Organisations have existed for 10 years.

Private sector participation in water supply has been introduced as early as 1997 and the private sector delivers now water to 20-30 per cent of the population. Morocco is the only country of the region, which has awarded concession contracts.

With 10 years of experience of private delivery, a favourable institutional framework, more than USD 4 billion of projected investments in potable water over 10 years and an important urban population growth of 26.6 per cent expected over the next 10 years, private sector participation in water supply is expected to increase strongly in the near term. Potential

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forms of private involvement are concession contracts as in Rabat, Casablanca, Tangiers and Tetouan, and BOT contracts for some water desalination plants.

### **E. Jordan**

Jordan is the most water scarce country of the Mediterranean area with only 165.1 cubic metres of water per inhabitant per year. Considering the water scarcity and over withdrawal problems, allocation of water in Jordan is a critical issue. However, 75 per cent of water is used for agriculture, while it contributes only to 2.8 per cent of the GDP. The low pricing policy in favour of agriculture needs to be revised in the near term.

The performance of water supply is not satisfactory. While 96 per cent of urban population has household connections, water is rationed and is available only a couple of days per week (about 75 hours per week). Unaccounted for water is very high at 47 per cent and prices cover only 70 per cent of operating costs.

One of the main problems lies in tariff setting. On the positive side, tariffs are progressive and set locally. In addition, the metering practice is very well developed (the annual equipment rate is of 9.3 per thousand inhabitants). On the negative side, tariffs are set too low in general and water for agriculture is significantly subsidised.

The second problem resides in the institutional framework. Water governance is centralised, political interferences are abundant and corporatised operators are not fully independent.

Private involvement in water supply is important. About 40 per cent of the population's water is delivered by private operators. Considering the urban population growth (expected to be around +24.7 per cent over 10 years), the good economic environment, the development of a desalination market and the already relatively high level of private involvement, private sector participation in water supply should moderately increase in the near and medium term.

It is likely that the form of development will be the management contract. The institutional framework does not seem favourable for a higher degree of private involvement, such as concession contracts. Since desalination capacity is expected to be multiplied by 10 over the next 10 years, BOT contracts for desalination will also be awarded.

## VIII. CONCLUSION

The southern Mediterranean area is one of the most water scarce regions of the world; 8 of the 11 MEDA countries have less than 1 000 cubic meters of renewable fresh water per person per year. Climate change and demographic phenomena will worsen the scarcity.

Mediterranean countries also face important problems of access to water in urban areas. With an expected urban population growth of 63.8 per cent (based on 2004 estimates of the UN population Division) in the MEDA region over the next 25 years, the issue of urban water supply is essential for health and economic development.

The total cost of projected investments in potable water over the next 10 years in Algeria, Egypt, Jordan, Morocco and Tunisia is expected to reach USD 21 billion. Considering the importance of forecasted expenses, countries of the MEDA region will need to tap private finance capital, local or international, in addition to public funding. Thus, private sector participation in water supply is expected to increase in several countries of the region in the near and medium term.

However, the review of the economic literature and empirical studies has shown that private sector participation, per se, does not systematically lead to gains in efficiency. Delegating water services to private operators, without a well-defined regulatory environment, cannot be successful. Thus, the reform of the water supply institutional framework is an essential prerequisite.

The study has shown that governments of Mediterranean countries are well aware of the urgency of reforming the water supply sector. Some countries started to restructure the organisation of the sector a long time ago; others are still at the beginning of the process.

The Moroccan experience with institutional reform and private sector participation in water services over the last 10 years provides a good example for other countries of the region. Algeria is also well on track to successfully reorganise the water supply sector. In these two countries, private involvement in drinking water is expected to increase strongly in the near term.

The experience of Tunisia reveals that countries can also opt for public delivery and manage water supply very efficiently. However, some public sector reforms, such as corporatisation of local operators and decentralisation, could improve the service.

In other countries, Jordan and Egypt, the situation is a greater concern; governments need to pursue their efforts in reshaping the institutional framework of the water supply sector and should address the problem of unviable tariffs immediately.

Overall, the study has shown that institutional arrangements and pricing policy seem to be the two factors that matter the most in improving water supply.

## ANNEX: IS PRIVATE WATER PROVISION MORE EFFICIENT THAN PUBLIC DELIVERY? A REVIEW OF CASE STUDIES AND ECONOMETRIC TESTS

Region or Country	Method	Results	References
Africa	Stochastic Production Frontier	Private operators are more cost efficient	Estache and Kouassi (2002)
Africa	Stochastic Production Frontier / Data Envelopment Analysis	No differences in costs	Kirkpartick, Parker and Zhang (2004)
Argentina (Buenos Aires)	Multiple Case Studies	Positive effect of the introduction of private sector participation on the sector performance	Abdala (1997); Alcazar <i>et al.</i> (2002); Artana <i>et al.</i> (1999); Crampes and Estache (1996); Rivera (1996)
Argentina (Cordoba)	Case Study	Positive effect of the introduction of private sector participation on the sector performance	Nickson (2001a)
Argentina (Corrientes)	Case Study	Positive effect of the introduction of private sector participation on the sector performance	Artana, Navajas and Urbiztondo (1999)
Argentina (Salta)	Case Study	Positive effect of the introduction of private sector participation on the sector performance	Salatiel (2003)
Argentina (Tucumán)	Multiple Case Studies	Negative effect of the introduction of private sector participation on the sector performance	Rais, Esquivel and Sour (2002); Artana, Navajas and Urbiztondo (1998)
Asia	Stochastic Cost Frontier	No differences between public and private	Estache and Rossi (2002)
Bolivia (Cochabamba)	Multiple Case Studies	Negative effect of the introduction of private sector participation on the sector performance	Nickson and Vargas (2002); Hall (2002)
Bolivia (La Paz – El Alto)	Multiple Case Studies	Mixed results of the introduction of private sector participation on the sector performance	Hall and Lobina (2002); Komives (1999, 2001); Komives and Brook-Cowen (1998)
Brazil	Data Envelopment Analysis	No differences between public and private	Seroa da Motta and Moreira (2004)
Chile (Santiago)	Multiple Case Studies	Positive effect of the introduction of private sector participation on the sector performance	Rivera (1996); Shirley, Xu and Zuluaga (2002)
Colombia (Barranquilla)	Case Study	Positive effect of the introduction of private sector participation on the sector performance	Avendaño and Basañes (1999)

Colombia (Cartagena)	Multiple Case Studies	Positive effect of the introduction of private sector participation on the sector performance	Rivera (1996); Nickson (2001b); Beato and Díaz (2003); Avendaño and Basaños (1999)
Colombia (Marinilla)	Multiple Case Studies	Positive effect of the introduction of private sector participation on the sector performance	Arévalo and Schippner (2002); Avendaño and Basaños (1999)
Colombia (Montería)	Case Study	Positive effect of the introduction of private sector participation on the sector performance	Avendaño and Basaños (1999)
Côte d'Ivoire	Multiple Case Studies	Positive effect of the introduction of private sector participation on the sector performance	Collignon (2002); Kerf (2000); Menard and Clarke (2002a); Trémolet, Browning and Howard (2002)
France	Regression Model	No difference in compliance with water quality regulation	Menard and Saussier (2000)
Gabon	Multiple Case Studies	Positive effect of the introduction of private sector participation on the sector performance	Trémolet (2002); Trémolet and Neale (2002)
Gambia	Case Study	Negative effect of the introduction of private sector participation on the sector performance	Kerf (2000)
Guinea	Multiple Case Studies	Mixed results of the introduction of private sector participation on the sector performance	Brook-Cowen (1999); Brook and Lucussol (2001); Clarke, Ménard and Zugula (2002); Kerf (2000); Ménard and Clarke (2002b); Rivera (1996)
Honduras (San Pedro Sula)	Case Study	Positive effect of the introduction of private sector participation on the sector performance	Díaz (2003)
India (Prune)	Case Study	Negative effect of the introduction of private sector participation on the sector performance	Zérah (2000)
Latin America (Argentina, Bolivia, Brazil)	Regression Model	Private sector participation per se does not improve coverage	Clarke, Kosec and Wallsten (2004)
México (Cancún and Isla Mujeres)	Case Study	Mixed results of the introduction of private sector participation on the sector performance	Rivera (1996)
México (Mexico City)	Case Study	Mixed results of the introduction of private sector participation on the sector performance	Haggarty, Brook and Zuluaga (2002)
Philippines	Multiple Case Studies	Mixed results of the introduction of private sector participation on the sector performance	Dumol (2000); Santos (2003); Porter (2001)
Poland (Gdansk)	Case Study	Positive effect of the introduction of private sector participation on the sector performance	Rivera (1996)
Senegal	Multiple Case Studies	Positive effect of the introduction of private sector participation on the sector performance	Kerf (2000); Trémolet, Browning and Howard (2002)

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		performance	
South Africa (Queenstown)	Case Study	Mixed results of the introduction of private sector participation on the sector performance	Palmer Development Group (2000)
Trinidad and Tobago	Multiple Case Studies	Negative effect of the introduction of private sector participation on the sector performance	Nankani (1997); Stiggers (1999)
United Kingdom	Financial Analysis	No differences after privatisation	Shaoul (1997)
United Kingdom	Cost Function	Regulation lowered costs but privatisation did not	Saal and Parker (2000)
United Kingdom	Productivity analysis	No difference in efficiency after privatisation	Saal and Parker (2001)
United States	Cost Function	Private has lower costs	Morgan (1977)
United States	Cost Function	Private has lower costs	Crain and Zardkoohi (1978)
United States	Cost Function	Public has lower costs	Bruggink (1982)
United States	Cost Function	No differences in costs	Feigenbaum and Teeplees (1983)
United States	Data Envelopment Analysis	No differences in efficiency	Byrnes et al. (1986)
United States	Econometric cross-sectional analysis	Lower prices charged by municipality, but no conclusion on costs	Hausman, Kemme and Neufeld (1986)
United States	Cost Function	No differences in costs	Teeplees and Gyler (1987)
United States	Stochastic Cost Frontier	No differences in costs	Byrnes (1991)
United States	Data Envelopment Analysis	Public operators are more efficient	Lambert et al. (1993)
United States	Stochastic Cost Frontier	Public operators are more cost efficient	Lynk (1993)
United States	Cost Function	No differences in efficiency	Bhattacharyya <i>et al.</i> (1994)
United States	Data Envelopment Analysis	Private operators are more efficient	Bhattacharyya <i>et al.</i> (1995)
United States	Regression Model	No difference in compliance with water regulation.	Wallsten and Kosec (2005)

Source: Edouard Pérard, "Water Supply: Public or Private?" (Forthcoming in 2007), presented at the conference "The Role of the State in Public Service Delivery" at Lee Kuan Yew School Of Public Policy, National University of Singapore, September 2007.

Based on Dupont and Renzetti (2004); Clarke, Kosec and Wallsten (2004); Estache, Perelman and Trujillo (2005) and literature review.



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