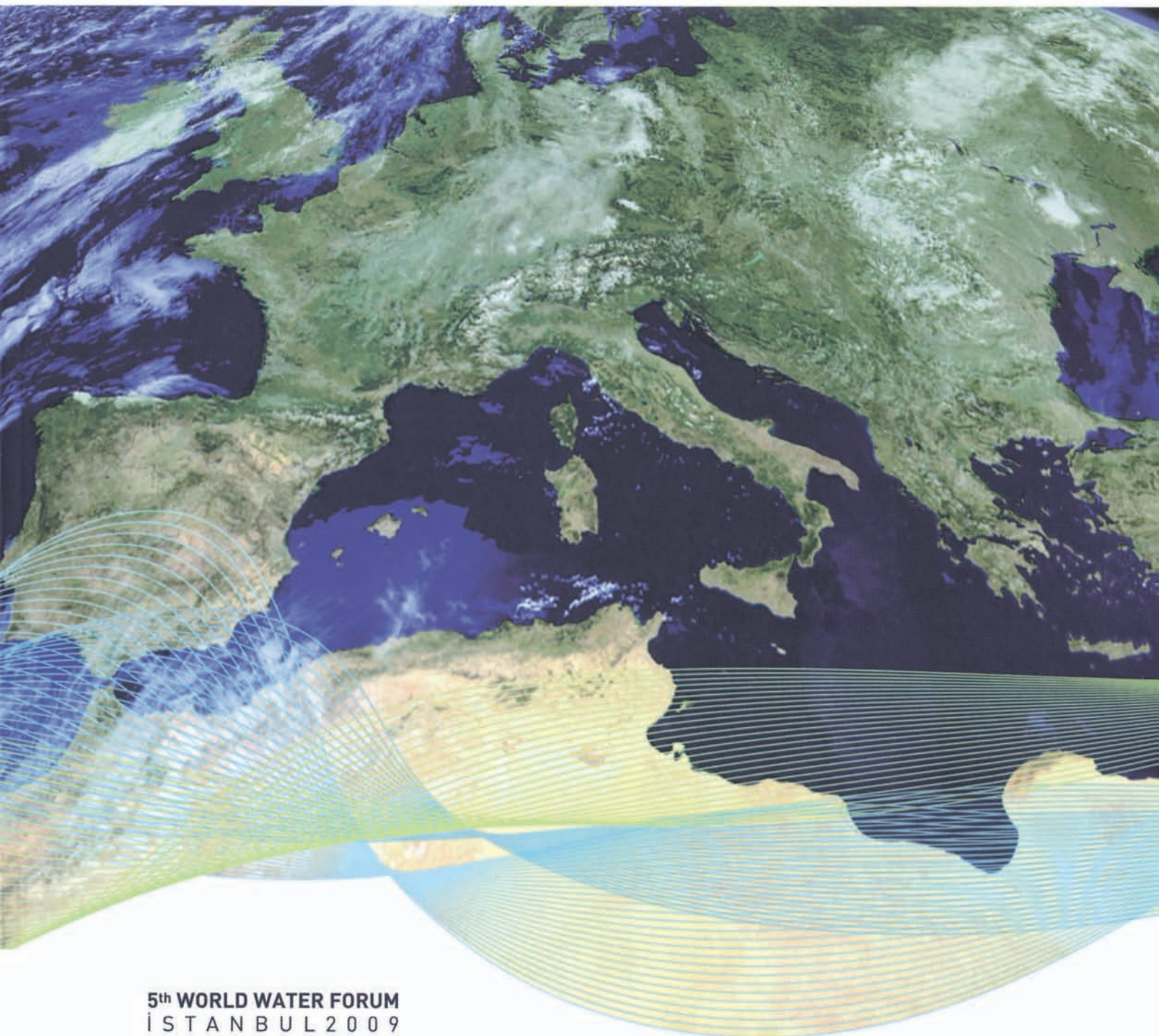


Regional Document

MEDITERRANEAN



5th WORLD WATER FORUM
İSTANBUL 2009



BRIDGING
DIVIDES
FOR WATER

REGIONAL DOCUMENT

MEDITERRANEAN



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INTRODUCTION



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The Mediterranean Region, a cross-road between 3 continents (Africa, Asia and Europe) and with particular geographical, ecological and geopolitical specificities, faces important water challenges. Aiming to meet water objectives, action is taken by all countries and a variety of stakeholders at national, local as well as regional levels. Key water challenges and responding actions will be presented and debated at the Mediterranean Session of the 5th World Water Forum.

Following an open and consultative approach, the preparatory process for the organization of the Mediterranean Session (launched in March 2007 in Istanbul) gathered together key Mediterranean organizations and initiatives and mobilized in an organized dialogue national and regional water stakeholders, including decision-makers, experts, professionals, public leaders and donors, representing a wide spectrum of authorities, organizations, institutes and initiatives.

Based on the outcomes of the preparatory process and the discussions in Istanbul, the Mediterranean region will address a strong and constructive Message to the 5th World Water Forum, its Ministerial Conference, the Mediterranean water agenda and the world at large, contributing in «Bridging Divides for Water ».

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MEDITERRANEAN SESSION REGIONAL DOCUMENT



1

Background of the Regional Document

1.1. Objectives

The main objectives of the regional document are the following:

- Set out the Mediterranean context in relation to key water data and water resources management, highlight similarities and differences existing between the countries
- Inform on progress made in the region for meeting the millennium development goals and the Johannesburg targets,
- Present points of view of various stakeholders on key water issues in the region aiming to enhancing synergies and cooperation,
- Explore ways for further developing action to reach a sustainable and efficient management of water resources,
- Raise awareness of the necessity to working together in order to reach common objectives, in particular related to financing,
- Contribute to the elaboration of the new Mediterranean Strategy for Water.

The document addresses the entire spectrum of water stakeholders in the Mediterranean:

- Public and regulating authorities at national and local levels
- Public and private operators
- Representatives of the civil society, including associations of users of water and sanitation services
- Academia and the scientific community at large
- International agencies working in the water sector
- Public or private operators and companies acting in the field of financing the investment as well as building and managing infrastructure.

1.2. Preparatory Process

At the crossroad of three continents, the Mediterranean region is a privileged locus of exchanges between all countries composing it.

Thanks to its geographical, geoeconomic and geopolitical context, the region has placed water at the heart of its national and regional policies.

From Marseille to Alexandria, the stakes and challenges related to water are similar.

Beyond the obvious disparities, similarities which are linked to climate, geography and multiseccular cultures represent a broad field of cooperation that rim countries seek to avail themselves of in order to improve their water management and make of it the foundation of enhanced solidarities.

The Mediterranean region has always been represented by its water community at the World Water Fora. This participation highlighted the multiplicity of stakeholders, programs and processes contributing to reach set objectives (the Millennium Development Goals, Johannesburg Targets on Integrated Water Resources Management, Protection of the Environment, etc). In view of its specificity, the Mediterranean region has experienced various approaches stemming from legitimate and collective regional processes (amongst which the Mediterranean Action Plan launched in 1975, the Euro-Mediterranean Partnership in 1995, etc), funding programs (MEDA, ENPI etc), assistance programs and initiatives (METAP, MED-EUWI, Horizon 2020, etc) as well as regional multi-stakeholder partnerships (such as GWP-Med).

Aiming to continue the legacy of dialogue in the framework of World Water Fora, a consultative process leading to the "Mediterranean Session" of the 5th World Water Forum has been implemented. Since December 2006, a Coordination Committee was set up to design and overlook the preparations for the Mediterranean Session. The process was an integral part of the Forum's preparations and strived to be federative and complementary with other sub-regional initiatives.

Effort was made for the Coordination Committee to be representative of the Mediterranean water community consisting of Mediterranean countries and Networks that volunteered to contribute to the activity.

Its members are:

- The State Secretary of Water and Environment of Morocco,
- The General Directorate in charge of Town and Country Planning, Housing and Nature of the French Ministry of Ecology, Energy, Sustainable Development and Town and Country Planning
- The General Directorate for Water of the Spanish Ministry of Environment, Rural and Marine Environment,
- The Department of International Relations and EU Affairs of the Hellenic Ministry for the Environment, Physical Planning and Public Works,
- The Mediterranean Water Institute (IME), the Global Water Partnership-Mediterranean (GWP-Med), the Blue Plan (Regional Activity Centre of the Mediterranean Action Plan), the Regional Activity Centre of the Priority Action Program (Mediterranean Action Plan, PAP/CAR) and the Mediterranean Network of Basin Organisations (MENBO).

The coordination of the Session is ensured by the Mediterranean Water Institute.

The preparatory process was supported by two main approaches:

- A geopolitical approach based on the Euro-Mediterranean Partnership through periodic Conferences of the Water Directors of the Euro-Mediterranean and South-Eastern

European Countries

- A multilateral cooperation facilitated by the Mediterranean Action Plan (MAP).

Euro-Mediterranean Partnership / Union for the Mediterranean

Engagement of and exchange of information among water stakeholders at the regional and national levels is among key prerequisites for integrated water resources management.

The Forum of the Water Directors of the Euro-Mediterranean and South-Eastern European Countries in the framework of the Euro-Mediterranean Partnership has provided a valid platform among Mediterranean countries, with the participation of key regional stakeholders as observers, for exchange of information, debate and assessment of progress on activities implemented through different initiatives and programmes related to water.

The Euro-Mediterranean Ministerial Conference on Water (Dead Sea, Jordan, 22 December 2008) provided new impetus for cooperation on water resources management in the region within the Union for the Mediterranean, reaching to a set of important decisions. The Ministerial Declaration is annexed to this document.

The Mediterranean Action Plan (MAP)

Launched in 1975 within the framework of the Regional Seas Programme under UNEP's umbrella (United Nations Environment Programme), today the MAP involves the 21 countries and territories bordering the Mediterranean as well as the European Community. Together, they are determined to meet the challenges of environmental degradation in the sea, coastal areas and inland, and to link sustainable resource management with development, in order to protect the Mediterranean region and contribute to an improved Mediterranean quality of life.

The Integrated Water Resources and Demand Management is one of the MAP priority actions as reflected by the Mediterranean Strategy for Sustainable Development adopted in 2005.

The programmes and actions implemented within the MAP provide for exchange and dialogue between the Mediterranean countries and the European Community, and particularly during the meetings of the Contracting Parties to the Barcelona Convention and, also, the meetings of the Mediterranean Commission on Sustainable Development (MCSD) which is linked with the civil society.

The activities led by the MAP Regional Activity Centres such as the Blue Plan and the PAP/RAC allow also common discussion between Mediterranean countries during workshops or seminars gathering representatives of national and local authorities, universities, private and association sectors.

In the Mediterranean region, several initiatives and programmes are implemented under various frameworks and are supported by different sources of financing, including:

- MEDA WATER Programme for local management: decided at the Euro Mediterranean Ministerial Conference of Turin (1999), this programme is based on the Barcelona Process (1995). It allowed the implementation of nine projects (2003-2008) focused on specific topics of the local water management.
- Mediterranean Component of the European Union Water Initiative (MED EUWI): launched at the Johannesburg Summit (2002) is implementing targeted regional and national activities aiming to assist in reaching the MDGs and WSSD Targets, with the involvement of a wide stakeholder partnership, under the lead of Greece and the European Commission.

Other important initiatives and programmes also contribute to water objectives like those of the World Bank, European Investment Bank, African Development Bank, African Water Facility, GEF International Waters, UNDP, UNESCO, UN ESCWA, UNECE, the Horizon 2020 to De-pollute the Mediterranean, etc. and more are about to be launched by international and regional institutions like the GEF Strategic Partnership for the Mediterranean Large Marine Ecosystems, etc. Bilateral ODA is a key partner in national efforts towards achieving water objectives, particularly in the south and east of the Mediterranean. Since 2000, the EU Water Framework Directive provides the key framework for water action in the north part of the Mediterranean.

Furthermore, a wide set of regional, national and local activities are implemented through the action plans of Mediterranean stakeholder networks like AWC, EIC, GWP-Med, IME, MedCities, MedWet, MENBO, MIO-ECSDE, etc, as well as institutions, NGOs and other types of organizations like CEDARE, CIHEAM, EMWIS, IUCN, OECD, OIEau, OSS, WWF, etc.

1.3. Preparatory Process Meetings of the Mediterranean Session

2007	<p>March: Launching of the 5th World Water Forum preparatory process (Istanbul)</p> <p>March: 3rd Regional Workshop on 'Water Demand Management in the Mediterranean' (Zaragoza) – 19-21 March 2007</p> <p>April: Workshop on Integrated Water Resources Management (IWRM) in Libya – 11-12 April 2007</p> <p>May: Meeting of the Circle of Mediterranean Parliamentarians for Sustainable Development (Corfu) – 3-4 May 2007</p> <p>May: 12th Meeting of the Mediterranean Commission on Sustainable Development (Istanbul) – 30 May 2007</p> <p>June: 4th Meeting of the Working Group of Experts designated by the contracting partners in the Draft Protocol on ICZM in the Mediterranean (Split) – 13-16 June 2007</p> <p>October: Conference on "Horizon 2020" and Private Investor Involvement (Athens) – 22-23 October 2007</p> <p>November: 1st Coordination Meeting of the</p>
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	<p>Mediterranean Session</p> <p>December: 4th Conference of the Water Directors of the Euro-Mediterranean and South-Eastern European Countries (Bled) – 10-11 December 2007</p>
2008	<p>January: 15th Ordinary Meeting of the Contracting Parties to the Barcelona Convention (Almeria) – 15-18 January 2008</p> <p>February: 2nd Mediterranean and Regional Coordination Meeting (Istanbul)</p> <p>May : Mediterranean Workshop on ICZM Policy (Alghero - Sardinia) – 19-21 May 2008</p> <p>July: 5th Conference of the Water Directors of the Euro-Mediterranean and Southeastern European Countries (Athens) – 21-22 July 2008</p> <p>October: Regional workshop on "Climate change in the Mediterranean" (Marseille) – 22-23 October 2008</p> <p>December: Euro-Med Civil Society Meeting (Dead Sea, Jordan) – 21 December 2008</p> <p>December : Euro-Med Ministerial Conference on Water (Dead Sea, Jordan) – 22 December 2008</p>
2009	<p>January: Regional Conference on the Mediterranean Session of the 5th World Water Forum (Tunis) – 15 January 2009</p> <p>February: 2nd Water Week in Lebanon (Beirut) – 4-7 February 2009</p>

1.4. Content of the Regional Document

The present document gives a general overview of the Mediterranean Region describing this region as an original and unique eco-region.

Among the various areas which constitute the thematic of water in the Mediterranean region, four of them have been considered as priorities, as well as by the Dead Sea Conference held in December 2008 than the Tunis Conference held in January 2009. These priorities areas are the following:

- **Water Governance**
- **Water Demand Management and Non-conventional Resources**
- **Water Financing**
- **Integrating the Climate Change Dimension into Water Resources Management**

These contributions are not exhaustive statements of the existing situation, but syntheses allowing a reflection of the possibilities of quickly reaching a more successful and more long-lasting management of water resources.

The contribution on "**Water Governance**" describes the situation country by country and show relevant solutions among which:

- Management tools
- Improvement of legal framework
- Distribution of the responsibilities
- Intensification of measures of management demand
- Fight against the corruption
- Development of the training, exchanges of data and awareness of all stakeholders

It concludes on the necessity of strengthening the cooperation between countries in the perspective of the implementation of the Mediterranean Water Strategy.

The contribution on **“Water Demand Management and non conventional Water Resources”** explains the challenges met by the region in its attempt to balance supply and demand, and clarifies how the Demand management and the use of non conventional resources can answer these challenges. It indicates the progress

still remaining and proposes technical, legislative, institutional and economic solutions. Experiences of Mediterranean countries (France, Jordan and Egypt) are presented.

The contribution on **“Water Financing”** presents different ways to adapt the financial resources to the need of growing investments. It describes the conditions to create a real financial strategy and proposes measures able to face the necessary doubling of the financial streams in the water sector.

The contribution on **“Integrating the Climate Change into Dimension Water Resources Management”** presents what we know about in terms of impacts of the climate change on water resources in the Mediterranean Region; it also proposes technical and economic solutions, most of them being part of a true integrated water management policy.

1.5. Organization Committee of the Mediterranean Session

Partners	Person contact	Position
France General Directorate in charge of Town and Country Planning, Housing and Nature Ministry of Ecology, Energy, Sustainable Development and Town and Country Planning	Jean Paul Rivaud Philippe Guettier Sylvie Detoc	Head of International and European Unit Deputy Head of Water Unit Project Officer for International and Community Affairs
Greece Department of International Relations and EU Affairs of the Hellenic Ministry for the Environment, Physical Planning and Public Works	Maria Peppa Maria Papaioannou Roza Ieremia Christos Demetropoulos	Head Department Expert Head, Int. Organ., MFA Expert, Int. Organ., MFA
Morocco State Secretary of Water and Environment	Abdelkbir Zahoud Majid Benbiba	State Secretary for Water and Environment Director for Water Research and Planning
Spain General Directorate for Water Ministry of Environment, Rural and Marine Environment	Teodoro Estrela Miguel Antonin	Water Deputy Director Head for International Affairs
BLUE PLAN	Lucien Chabason Henri-Luc Thibault Gaëlle Thivet	Chairman Director Project Officer
GWP -MED	Michael Scoullou Vangelis Constantianos	Chairman Executive Secretary
MENBO	Walter Mazzitti Ramiro Martinez	Chairman General Secretary
MEDITERRANEAN WATER INSTITUTE	Mohamed Ennabli Hachmi Kennou Malika Roussel Jean Pierre Sabatier	Chairman Executive Director, Regional Coordinator Project Manager Project Officer
PAP/RAC	Ivica Trumbic	Director

2

Regional Overview

2.1. The Mediterranean: An Original and Unique Eco-region

The Mediterranean is one of the world regions in which the call for “sustainable development” find all its meaning:

- It is a rare and fragile “eco-region”, where development is already hindered by environmental degradation;
- It encompasses a geographical area in which North-South issues concerning development are particularly acute;
- It comprises a set of countries and an area where stability and prosperity will largely depend on implementing models of development which integrate environmental, social and economic dimensions.

This “eco-region” stands out for its climatic zone and the common and shared sea which links three continents. It is the hub of past civilisation whose heritage and cultural landscapes give added meaning to the sense of belonging to the Mediterranean. A sense shared by nations on the three banks. Alas, it is also one of the main “hot spots” of global biodiversity. In a mere 1.6% of the world’s land area it supports 10% of known higher plant species, and 7% of marine species in less than 0.8% of its total ocean area. Many of these species are endemic (Figure 1). Hydric stress, aridity in the South, natural hazards, limited plain areas and communication difficulties represent serious constraints.

In 2006, the Mediterranean’s 23 states and territories (riparian and Jordan) (figure 1) accounted for:

- 6.5% of the planet’s land mass, including a large number of desert and mountain areas,
- 7% of the world’s population (a stable share) with 458 million inhabitants,
- 31% of international tourism, with 263 million visitors,
- 12% of world GDP (decreasing),
- 60% of the population of the world’s “water-poor” countries¹
- 8% of CO₂ emissions (increasing). As for the sea, it accounts for 30% of international maritime freight traffic and some 20 to 25% of maritime oil transport.

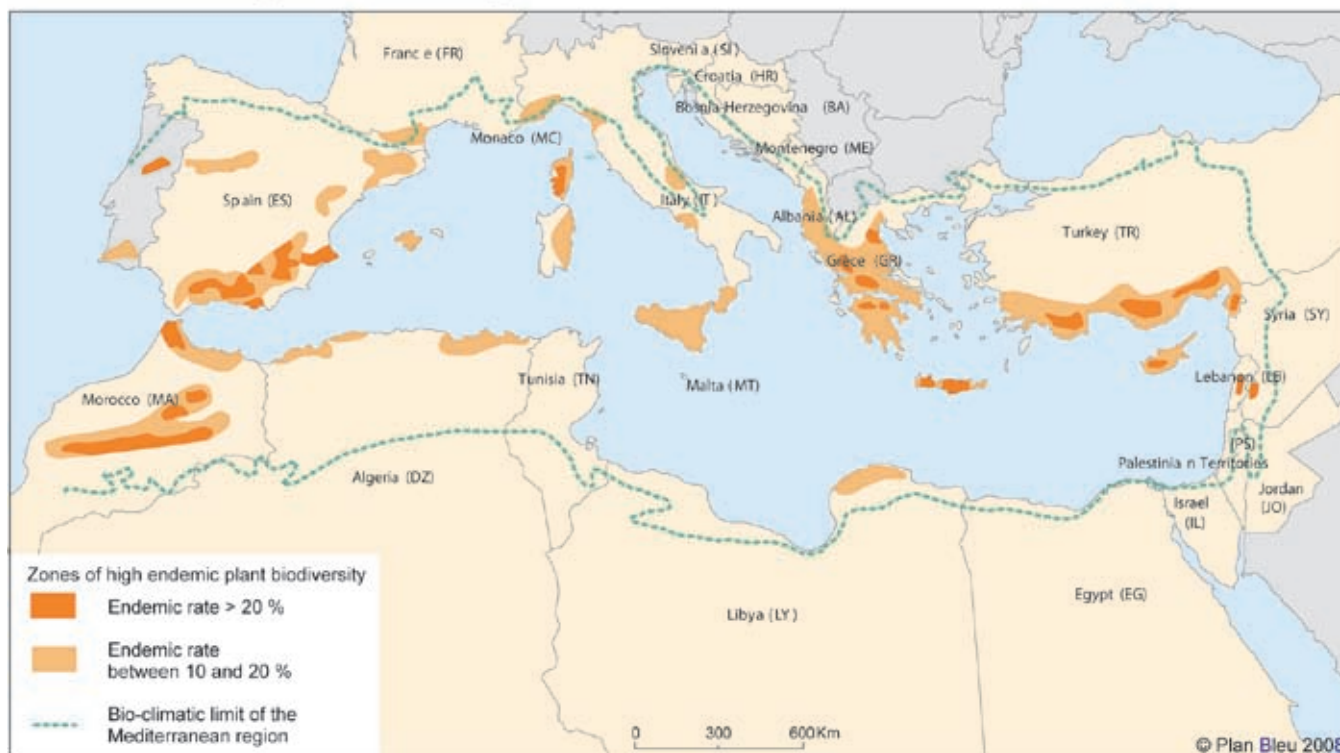
2.2. The Development Framework through to 2025: Economic, Social & Environmental Aspects

A region exposed to natural hazards

Lying on the point of contact between two major lithospheric plates and thereby affected by subduction, collision and slippage

Figure 1: Countries and areas with a high level of endemic plant biodiversity in the Mediterranean bio-climatic zone

Endemic nature of plant bio-diversity



Source: Zones of high endemic plant biodiversity according to Médail and Quezel, in *Annals of the Missouri Botanical Garden*, 84 (1997)

movements, the Mediterranean is one of the world's major seismic areas (Algiers in 1717, Messina in 1908, Izmir in 1999). The most highly exposed area stretches across Italy, Greece, and the Near-East, as well as the Northern Maghreb. The earthquake risk is increased by urbanisation. Volcanic activity is more localised. Nowadays, the principal area at risk is Vesuvius, above Naples. Besides these two major hazards, the effects of meteorological extremes are aggravated by accelerated coastal urbanisation and climate change:

- **Landslides:** they are usually triggered by intensive and aggressive Mediterranean downpours, which are likely to become more frequent and intense as a result of climate change. The risk increases in areas where vegetation has been reduced by forest fires and is no longer able to play its stabilising role. Often located close to and above the numerous tarmac roads, their number has shot up over the last 20 years.
- **Floods:** In the Mediterranean, the watercourse system is strongly marked by the contrast between the summer, when watercourses are a mere trickle, and the winter when they take up most of the riverbed. As a result of the torrential rains in autumn, river levels often rise abruptly and in the space of a few hours the flow becomes enormous in comparison with the size of the watercourse. The consequences can be disastrous. Since the disaster in Nîmes in 1988, the list has grown considerably, and virtually not a year goes by without the Mediterranean bewailing some flood-related disaster.

A region which is particularly sensitive to climate change

According to the 4th IPCC report, the Mediterranean is one of the regions of the world in which the environment and human activities will be most affected by global warming, with the scale of the expected physical changes threatening to cause considerable loss in economic and human terms.

Analyses conducted by climate experts converge on a number of forecasts for the Mediterranean. By the turn of the century, it is estimated that average annual temperatures will increase by between 2.2 and 5.1 degrees C for the Mediterranean. As for rainfall, due to thermo-dynamic effects such as a drop in relative humidity over the continents, average rainfall is highly likely to decrease across most of the region compared with today's climate. The number of rainy days will most probably fall, with a clear increase in the risk of drought. The snowy season will be shorter. According to the various models used, rainfall is set to decrease across all seasons, amounting on average to 24% in summer. As far as extreme climatic events are concerned, the models converge on:

¹ Countries in which per capita renewable natural water resources (not all of which are « available ») amount to less than 1,000 m³ water/capita/yr.

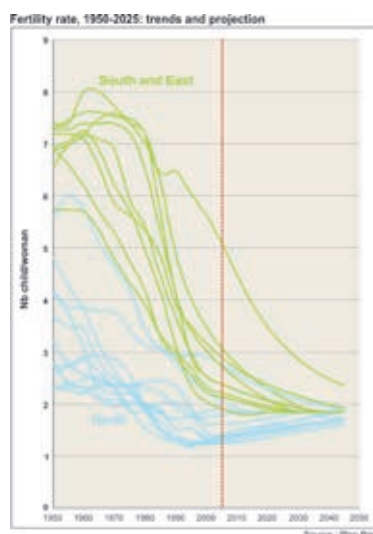
- a multiplication of heat-waves, with an increase in frequency, intensity and duration;
- a clear increase in continental drought: a drop in the number of rainy days, and an increase in the length of the longest rain-free periods.

The most vulnerable areas of the Mediterranean are the areas in North Africa which border on the desert zones, the major deltas -the Nile, Po and Rhone in particular- the coastal zones both to the North and to the South of the basin, as well as those areas undergoing strong demographic growth (southern and eastern shores, dense towns and suburbs).

Accelerated demographic transition, ageing populations in the North, job shortages in the South

The main observation over the last 20 years has been the drop in fertility rates in Southern and Eastern countries (SEMCs) as well as in Albania (Figure 2). The assumption for 2050 is that the demographic transition in the South will continue, as will therefore the convergence of fertility rates, which has been confirmed by the United Nations demographic projections.

Figure 2: Overall fertility indexes: developments since 1950 and projections



Source: United Nations Population Division, World Population Prospects: The 2006 revision

Despite the accelerated transition, the demographic swing between the rims is expected to continue. The population in the South and East has virtually doubled over 30 years, to reach 267 million inhabitants in 2006. By 2050, it could well grow by a further 138 million. Populations in Egypt and Turkey would then total 121 and 99 million inhabitants respectively. The population on the Northern rim -191 million in 2006- has only grown by 14% over the same 30 year period, and is only expected to increase by 4.5 million by 2025 (Indicators 1, 2, 3).

As a result of these demographic developments, the ageing issue is becoming a cause of increasing concern to the North of the Mediterranean, whilst in the Mediterranean countries on the southern and eastern rims, more than 22 million additional new jobs would need to be created within 20 years if current

employment levels are to be preserved (Source: FEMISE).

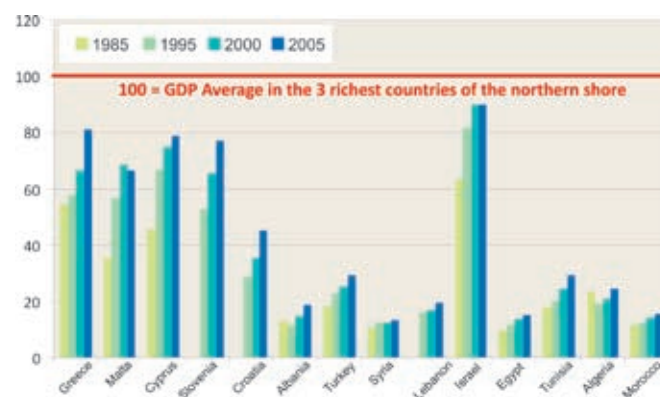
Tendentially speaking, it is mainly in the urban areas and along the coast that the increase in demographic pressure will be at its strongest. As for the rural population, at least up until 2025, it is not likely to decrease in the South and East where it is largest.

Economic performance in need of consolidation in order to reduce the North-South divide

Although over the 90s the SEMCs managed to stabilise their macroeconomic aggregates, economic growth on both rims has been lower than in other comparable regions worldwide. One of the reasons often put forward is the ever prevalent 'private means' and 'mining' features of the Mediterranean economy: revenue from land linked to the residential economy and certain types of farming practice, revenue from oil and gas, revenue from water abstraction from non-renewable resources, and the appeal of short-term speculative or commercial gains without any real strategy for developing goods and services.

Some progress has nonetheless been achieved: GNP growth rates since 2005 are higher in the SEMCs² than in the past, which would suggest the beginnings of convergence towards European per capita GDP levels. But, although the Mediterranean countries which have joined the European Union or are candidates for accession have caught up somewhat with France and Italy in terms of their GDP, the North-South GDP per capita gap in terms of purchasing power parity has not narrowed and ranges from 1 to 5 (Figure 3) (Indicator 5).

Figure 3: Per capita income differences between the three wealthiest countries on the Northern rim (SP, FR, IT) and the other Mediterranean countries (GDP/inhab)



Source: World Development Indicators 2007, World Bank

Economic performance has still not reached a level which would allow the rapid convergence of living conditions between north and south, and a drop in unemployment. Thus, youth unemployment has reached record levels on both rims, with many countries recording rates of 20-30%, even though in overall terms

² According to the FEMISE 2007 report, average annual growth rates were approaching 5% in 2006 and 2007 in the Mediterranean countries, in other words more than one point above the average growth recorded for 1995-2000.

unemployment rates would seem to be dropping.

At the same time, remarkable progress has been achieved in the South and East on reducing infant mortality and providing primary education, and significant efforts are underway to reduce the number of Mediterranean people with no access to drinking water (*Indicator 11*), sanitation (*Indicator 13*) or energy (some 20 million for drinking water, 47 million for sanitation and 9 million for energy). However, several countries are still seriously behindhand with high illiteracy rates particularly in rural areas. Although extreme poverty is limited, relative poverty is high and not abating (*Indicator 4*). Despite the progress achieved, access to information and gender equality are still lagging behind when compared with other regions around the world.

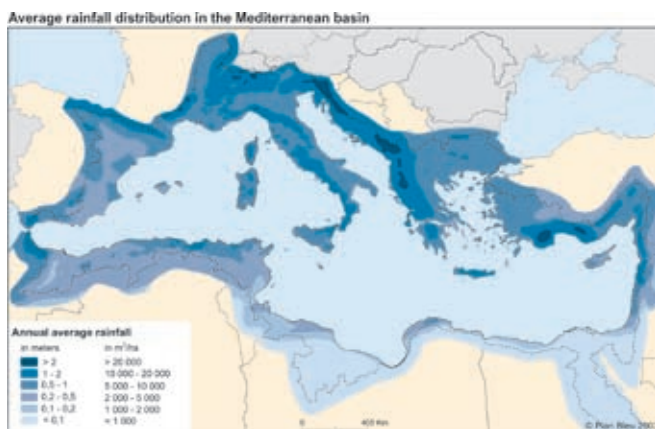
Economic growth trends through to 2025 are still highly uncertain, particularly in the South and East. Even though as an annual average for the Mediterranean Basin as a whole it stood at 2.7% per year for 2000-2025 (slightly above the 2.5% trend observed for 1985-2000), it would still not be enough to satisfy the demand for jobs in the Southern and Eastern countries, nor to reduce unemployment and revenue gaps between the two rims.

On the other hand, if the trend towards accelerated growth which has begun over recent years were to persist, and if regional cooperation were to be strengthened, per capita GDP convergence between the southern and northern rims could get underway. This would lead to greater social satisfaction and decreased risk of instability, and the Mediterranean could then increase its economic clout at world level.

Nonetheless in the medium term -in a context of scarcer resources- how the content of growth evolves will determine how compatible it is with the sustainable development objectives for the region. Everything will depend on the countries' ability to avoid the over-exploitation and degradation of their natural resources to underpin their economic growth.

In the long term, the economic impact of climate change on the countries on the southern and eastern rims is a cause for growing concern, particularly as far as the adaptation of these countries' economies is concerned.

Figure 4: Average rainfall distribution in the Mediterranean basin



Source: Plan Bleu

2.3. Increasing Pressures on Vulnerable Water Resources

Water in the Mediterranean is an irregular, rare and fragile resource

The Mediterranean climate is typified by an enormous irregularity in the distribution of rainfall in both space and time (Figure 4) (*Indicator 6*).

Renewable fresh water resources, both ground and surface, are estimated -for the whole Mediterranean countries, in average year- at about 1085 km³/year. Approximately two thirds (2/3) are concentrated in the Northern Mediterranean countries; the Eastern and Southern Mediterranean countries only hold a quarter and a tenth of the water resources, respectively, and the 7 least provided countries (Cyprus, Israel, Jordan, Libya, Malta, the Palestinian Territories and Tunisia) together hold less than 1% of the total.

Besides, 28% of these resources (300 km³/year) are transboundary and are, thus, shared by several countries, whether Mediterranean or not. The rate of dependence vis-à-vis external resources is particularly high in certain countries: 97% in Egypt (the Nile), 55% in Israel (the Jordan, Mountain Aquifer), 47% in Croatia and 43% in Syria (the Euphrates).

To this uneven distribution of water resources in terms of space, there must be added a quite marked irregular pattern in terms of time, both intra-annual and inter-annual. Intra-annual variability is characterised by a concentration of rainfall within a few months (50-100 days per year on average), as well as by a summer drought coinciding with the peak of highest water demand (irrigation, tourism). Concerning inter-annual variability, rainfall deficit years -with respect to the annual averages- are frequent. They may result from a winter and spring supply deficit (efficient rainfall), with especially hydrological impacts, and/or from an acuteness of summer drought (scope and length), with immediate impacts on soil and vegetation, together with delayed hydrological impacts.

This irregular pattern hampers considerably the possibility to exploit the surface water resources, and has given rise to the construction of several structures intended to ensure their storage and their intra-annual or inter-annual regulation. The rate of regulation of surface water, is thus, high in certain countries: 90% in Syria, 80% in Morocco and in Tunisia, 70% in Cyprus and 40% in Israël (*Indicator 10*).

It is advisable, however, not to restrict the resources to exclusively the "blue water" obtaining from surface and groundwater runoff, but to also consider and reckon the "green water", i.e. that which is generated by rainfall. The average annual flow of this "green water" is in the range of 400 to 500km³/year in the Mediterranean countries; though, here again, it is also unevenly distributed: 65% in the North, 20% in the East, and 15% in the South. This observation explains the importance of irrigation water demand in all the Eastern and Southern Mediterranean countries, a demand that is often of over 60%, and likely to reach in certain countries about 90% of the water demand for agriculture (inclusive of blue

Table 1: Renewable natural water resources in the Mediterranean region

		Sub-regions (whole countries)			Total
		North (Europe)	East (Near East)	South (North Africa)	
Renewable natural resources (blue water) (annual average) (a)	Total (km ³ /year)	740	248	95	1084
	Total (%)	68	23	9	100
	Per capita (m ³ /year)	3915	2371	631	2441
Competition index	Inhabitants/hm ³ /year	255	422	1584	410
Exploitable renewable natural resources (annual average) (b)	Total (km ³ /year)	359	133	81	572
	Total (%)	63	23	14	100
	Per capita (m ³ /year)	1899	1279	536	1289
Estimate of green water (annual average) (c)	Total (km ³ /year)	300	100	70	470
	Total (%)	64	21	15	100

Source: Plan Bleu, 2007

water and green water). The key figures given in Table 1 sum up the contrasts between the subregions.

It is most likely that the regional impacts of global climate change on the water cycle -though still hard to quantify within precise time frames- will impoverish the Mediterranean countries water resources, as well as exacerbate their variability, by more acute and more frequent droughts, and, thus, reduce possibilities of their exploitation both in the North and in the South. The more water-poor territories will be the most affected.

Several Southern countries have already revised down the quantified accounts of the water resources on which their development plans are based, either by precaution or by taking

into account the several dry years of the last decade, which brought down the average values by 20% in Algeria and by 25% in Morocco.

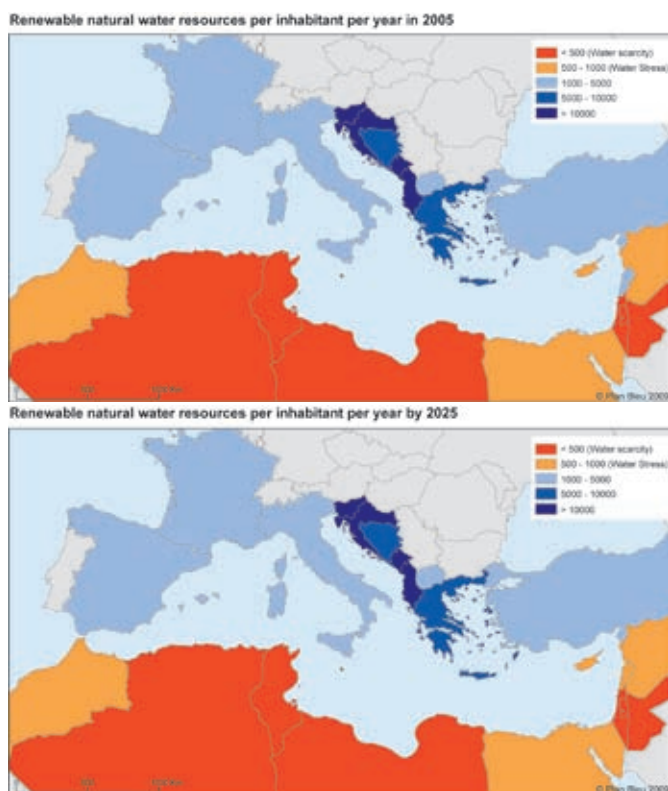
- (a) Internal and external resources, calculated by sub-region without double reckoning due to exchanges between neighbouring Mediterranean countries.
- (b) According to country-specific criteria.
- (c) Rainfall used and consumed ("evapotranspirated") by irrigated agriculture and pasture land.

The expression of average "natural" water resources per capita constitutes the first criterion serving to characterise the "water stress" or "water poverty" situations (between 1000 and 500 m³/capita/year) and the "structural scarcity" situation (less than 500 m³/capita/year), and helps illustrate the variances between countries and inland regions, or between basins (Figure 5) (*Indicator 7*). The number of water poor Mediterranean populations could reach 258 million inhabitants in 2025, 88 million of whom would be facing shortage conditions.

Growing demands in the South and East

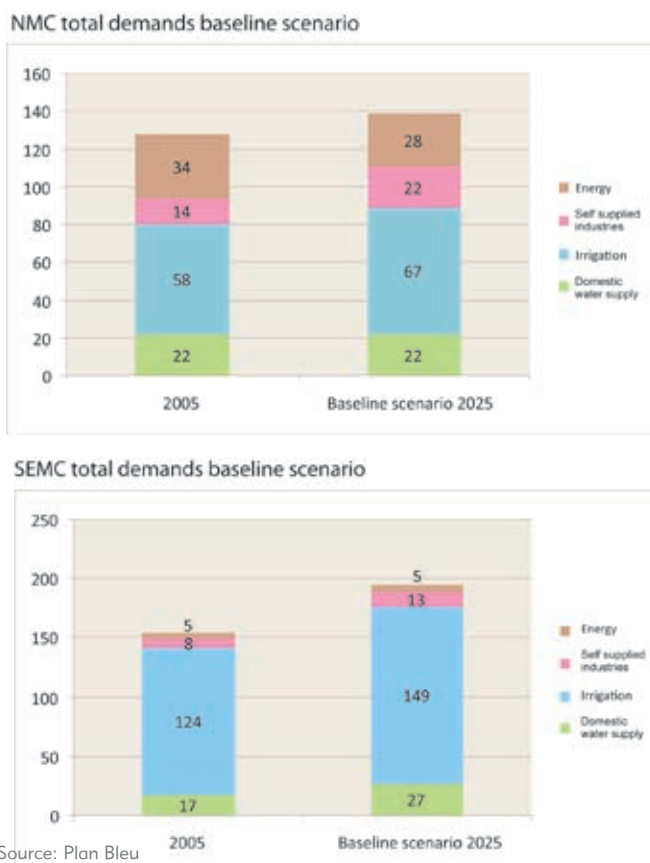
During the second half of the 20th century, water demand, i.e. the amount of resource abstraction (95% of total withdrawal) plus unconventional production practices (desalination, wastewater reuse...), including losses during transport and use -estimated at nearly 40% of total water demand-, has increased twofold, reaching 280 km³/year in all riparian countries in 2005. Agriculture is the main water-consuming sector (180 km³/year to irrigate 24 million hectares) and accounts for 64% of total water demand (45% in the North and 82% in the South and East), while it only remains marginal in the Eastern Adriatic countries. Water demand may increase by a further 18% by 2025, essentially in the Southern (28%) and Eastern (33%) countries, and mainly in Turkey and Syria (Figure 6).

Figure 5: Renewable natural water resources per inhabitant per year in 2005 and 2025



Source: Plan Bleu

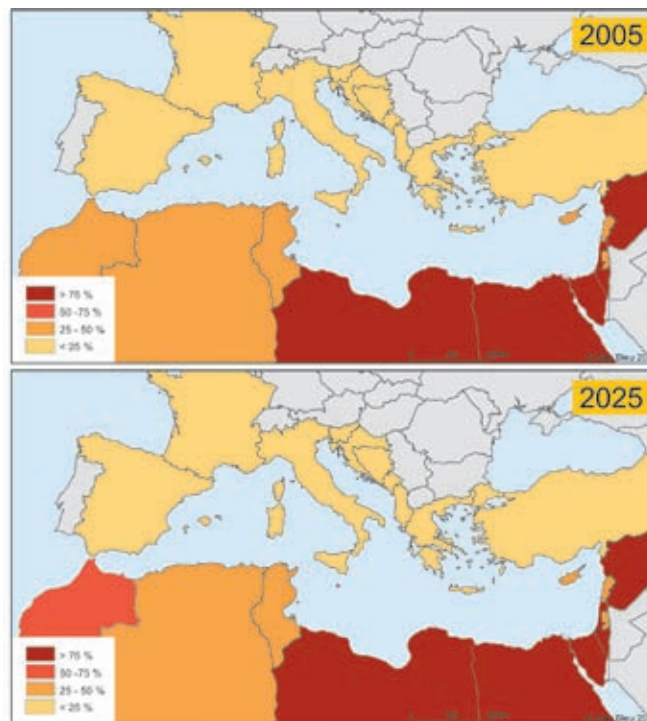
Figure 6: Water demand in the Northern (NMC) and Southern & Eastern (SEMC) Mediterranean countries in 2005 and 2025 (trend scenario)



By 2025, the significant increase in pressures on water resources, gauged by the **exploitation index of renewable natural water resources**³, highlights strong and sometimes alarming contrasts as regards the “future of water” (Figure 7) (*Indicator 9*). Today, in some countries (Egypt, Israel, Libya, Malta, Syria, Jordan) and in Gaza Strip, water withdrawals already near or even exceed the limit threshold of renewable resources. The current and future situations are even more alarming when the index is calculated at Mediterranean catchment area rather than country level. Pressures on resources appear even greater when considering the only « exploitable » water resources which account for about one third to a half of renewable natural water resources).

³ Defined as a ratio: volume of annual abstraction on renewable natural water resources / annual average volume of available renewable natural water resources, expressed as a percentage.

Figure 7: Exploitation index of renewable natural water resources, entire countries, 2005 and 2025



Source: Plan Bleu

Note: Indices nearing or exceeding 75% reveal very strong pressures exerted on water resources; ratios between 50 and 75% point significant medium-term risks of structural stress; indices between 25 and 50% indicate that countries may endure local or fluctuating stress.

Water demand is increasingly met by an unsustainable water production estimated at 16 km³/year, of which 66% coming from fossil water withdrawals and 34% from over-exploitation of renewable water. **The non sustainable water production index**⁴ is particularly high in Libya (86%), Gaza Strip (40%), Tunisia (29%), Algeria (29%) and Spain (25%).

The changes in temperature and rainfall described by the climatic models will further aggravate these trends. Development along these lines could give rise to acute crisis situations in some countries.

Pressures can also be qualitative. Many aquifers, particularly in the North, show excessively high contents of pesticides or nitrates. Forty-seven million Mediterranean people are deprived of access to improved sanitation systems, mainly in the South and in the Middle East. And everywhere, many rivers are subjected to chronic pollution due to non-treated domestic and industrial discharges.

⁴ Defined as a ratio: volume of annual abstraction on renewable natural water resources / annual average volume of available renewable natural water resources, expressed as a percentage.

Water policies still too supply-focused

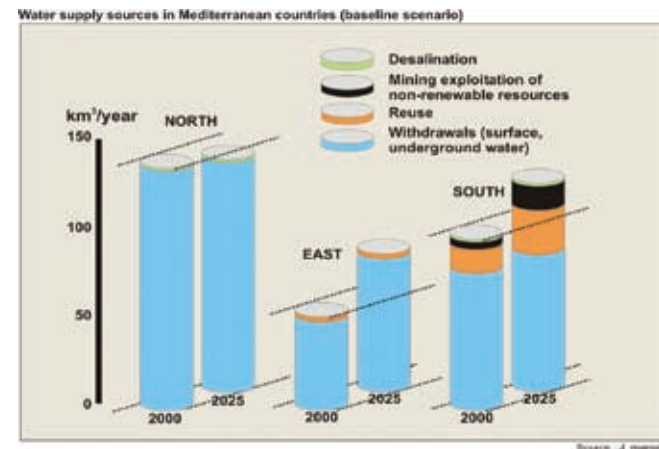
To meet growing demand, national strategies essentially rely on the extension of water supply and on major waterworks to enhance resource management and reduce risks resulting from natural constraints - 1,200 large dams are already recorded in the sole watershed area. The supply-based approach is expected to remain prevalent and lead to the following consequences (Figure 8):

- Increased withdrawal of renewable resources through major hydraulic projects, overexploitation of underground water and development of interregional and international transfers;
- Increased “mining” exploitation of non-renewable underground water resources in the Saharan basins. Such excessive abstraction may more than double by 2025, particularly in Libya and Algeria;
- The use of return water from agricultural drainage (Egypt, Morocco, Syria) and the reuse of treated wastewater for irrigation (Spain, Israel, Cyprus, Egypt, Tunisia);
- The development of industrial freshwater production through desalination of seawater or brackish water, as is currently the case in Malta, Spain, Algeria, Israel... Algeria (29%) and Spain (25%).

The continued application of policies focused on extending supply and pursuing abstraction represents severe risks in the long-term, such as the rapid depletion of some fossil resources, the destruction of coastal aquifers through seawater intrusion, the degraded quality of water and aquatic systems, reduced flows and the drying-up of wetlands. The factors of increasing “water vulnerability” could be aggravated. Supply-based policies are therefore reaching physical, socio-economic and environmental limits, as demonstrated in the South and East by the current condition of dams, where silting will probably reduce most of their capacity (in Algeria, some reservoirs have already lost 25% of their initial capacity).

The extent of pressure on resources may, in addition, lead to an exacerbation and multiplication of use conflicts between the using sectors, particularly according to optimisation criteria, such as - above all - between the cities and irrigated farming: allocation of resources for agriculture will be reduced in proportion for priority urban demand. There will also be conflicts with regard to resource sharing between regions or between countries, most particularly between the upstream and downstream of transboundary basins (the Euphrates, the Jordan, the Nile...). More generally, there will be conflicts between human and nature conservation uses: increased threat to ecosystems and constraints to their safeguard, as well as to possibilities of achieving the objectives of a “good ecological state” of water, as per the EU Water Framework Directive for the Northern Mediterranean Countries.

Figure 8: Water supply sources in Mediterranean countries



Source: Plan Bleu

Sources:

Blinda, M., Thivet, G., Plan Bleu (2006). Facing water stress and shortage in the Mediterranean. The Blue Plan Notes n°4. www.planbleu.org

Blue Plan (2008). The Blue Plan's sustainable development outlook for the Mediterranean. Sophia-Antipolis. www.planbleu.org

Giorgi, F. (2007). Climate change in the Mediterranean. Paper presented at the 12th meeting of the Mediterranean Commission on Sustainable Development, Istanbul (Turkey), 30-31 May 2007.

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⁵ Corresponding to the proportion of the total annual water withdrawals (including losses during transport) deriving from fossil aquifer reserves and from the overexploitation of water tables, expressed as a percentage.

Annex 1. Regional Overview: Data and Indicators

Reference year: 2006	Indicator 1		Indicator 2		Indicator 3	Indicator 4		Indicator 5	
Country	Total population (Inhabitants)	Population growth (annual %)	Urban population (Inhabitants)	Urban population rate (%)	Population density (Inhab/km2)	Poverty headcount ratio at nat. poverty line (% of pop.)		GDP PP (millions of cst 2005 international \$)	GDP PPP per capita (cst 2005 international \$)
Spain	44 121 300	1,65	33 902 807	77	88		NA	1 225 020	27 765
France	61 256 600	0,63	47 118 577	77	111		NA	1 899 238	31 005
Italy	58 842 800	0,40	39 871 881	68	200		NA	1 656 767	28 156
Greece	11 147 100	0,39	6 592 395	59	86		NA	339 017	30 413
Monaco	32 600	0,31	32 600	100	16 718		NA	NA	NA
Malta	406 000	0,62	387 892	96	1 269		NA	8 546	21 049
Cyprus	771 200	1,75	535 984	70	83		NA	19 344	25 083
Slovenia	2 006 800	0,31	1 027 080	51	100		NA	47 368	23 604
Croatia	4 441 300	-0,05	2 520 882	57	79		NA	61 588	13 867
Bosnia & Herz.	3 926 406	0,28	1 817 141	46	77	2002	19,5	24 688	6 288
Montenegro	601 022	-1,15	NA	NA	44		NA	5 262	8 755
Albania	3 172 155	0,58	1 463 632	46	116	2002	25,4	18 096	5 705
Turkey	72 975 000	1,25	49 447 860	68	95	2002	27,0	595 293	8 157
Syria	19 407 558	2,68	9 862 921	51	106		NA	79 466	4 095
Lebanon	4 055 301	1,10	3 516 757	87	396		NA	38 284	9 441
Israel	7 048 600	1,79	6 457 927	92	326		NA	164 603	23 353
Palestine	3 774 671	4,02	2 706 439	72	627		NA	13 187	3 493
Egypt	74 166 496	1,79	31 876 760	43	75	2000	16,7	356 023	4 800
Libya	6 038 643	2,01	5 138 885	85	3		NA	68 015	11 263
Tunisia	10 128 100	0,98	6 652 136	66	65	1995	7,6	67 328	6 648
Algeria	33 351 137	1,50	21 324 717	64	14	1995	22,6	205 146	6 151
Morocco	30 496 553	1,17	18 096 655	59	68	1999	19,0	115 711	3 794
Jordan	5 537 600	2,30	4 575 165	83	63	2002	14,2	24 837	4 485
NMC	190 725 283	0,75	135 270 871	71%	116		NA	5 304 933	27 819
SEMC	266 979 659	1,61	159 656 223	60%	39		NA	1 727 894	6 472
Mediterranean	457 704 942	1,25	294 927 094	64%	54		NA	7 032 827	15 365
World	6 538 082 878	1,18	3 197 735 145	49%	50		NA	58 639 125	8 969
Med / World	7,0%	-	9,2%	-	-		-	12,0%	-

Indicators related to water issues

Country	Indicator 6	Indicator 7		Indicator 9	Ind. 10	Indicator 11			Indicator 13			Indicator 12
	Mean annual precipitation (mm/year)	Water resources		Water resources exploitation index (%)	Dam-controlled runoff (%)	Drinking water coverage (%)			Sanitation coverage (%)			Municipal & Indus. wastewater treatment (%)
		Total (km3/year)	Per capita (m3/inhab/year)			Total	Rural	Urban	Total	Rural	Urban	
Spain	636	111,5	2527	20,3	NA	100	100	100	100	100	100	NA
France	867	200	3265	17,5	NA	100	100	100	100	100	100	NA
Italy	832	191,3	3251	21,9	86	100	100	100	100	100	100	NA
Greece	652	74,25	6661	10,5	NA	100	100	100	100	100	100	NA
Monaco	NA	NA	NA	NA	NA	100	100	100	100	100	100	NA
Malta	560	0,033	81	97,0	17	100	100	100	100	100	100	13
Cyprus	498	0,78	1011	28,2	70	100	100	100	100	100	100	100
Slovenia	1162	31,87	15881	2,8	NA	100	100	100	100	100	100	NA
Croatia	1113	71,4	16076	0,5	NA	100	100	100	100	100	100	NA
Bosnia & Herz.	1028	37,5	9551	2,5	NA	97	96	99	95	92	99	NA
Montenegro	NA	15,7	26122	0,3	NA	93	NA	NA	87	NA	NA	NA
Albania	1485	41,7	13146	4,1	NA	96	94	99	91	84	99	NA
Turkey	593	231,55	3173	18,8	100	96	93	98	88	72	96	61
Syria	252	18,21	938	91,7	90	93	87	98	90	81	99	40
Lebanon	661	4,41	1087	31,7	NA	100	100	100	98	87	100	1,3
Israel	435	1,78	253	92,7	40	100	100	100	100	100	100	63
Palestine	402	0,84	223	43,0	NA	92	88	94	73	61	78	NA
Egypt	51	56,8	766	97,7	100	98	97	99	70	58	86	79
Libya	56	0,6	99	83,3	NA	71	68	72	97	96	97	7
Tunisia	207	4,17	412	41,5	80	93	82	99	85	65	96	79
Algeria	89	11,67	350	38,5	NA	85	80	88	92	82	99	NA
Morocco	346	22	679	45,5	90	93	85	100	73	52	88	13
Jordan	111	0,932	168	91,0	50	98	91	99	85	71	88	88

NMC	8 833 (73%)	776 (69%)	4069
SEMC	3 203 (27%)	352 (31%)	1317
Mediterranean	12 036	1 128*	2464

NA: Non available

NMC: Northern Mediterranean Countries

SEMC: Southern and Eastern Mediterranean Countries

*The figure without duplication due to exchanges between neighbouring Mediterranean countries is 1084 km3/year
Sources: WDI 2008, Aqualat, OMS/UNESCO and calculations by Plan Bleu

3

Critical Issues Bridging and Dividing the Mediterranean Region

The geographic and geo-political context of the Mediterranean Region generates a specific issue related on the following priority areas:

- Water Governance
- Integrating the Climate Change Dimension into Water Resources Management
- Water Demand Management and Non-Conventional Water Resources
- Water Financing

3.1. Water Governance

The Mediterranean, a water scarce area, lies at the crossroads of three continents and it has been the cradle of major civilizations. Though the century-old experiences are largely shared, diverse natural and cultural backgrounds have resulted in uneven levels of economic development and a variety of socio-political systems. The region is encountering a rapid, unbalanced demographic growth and increased urbanization trends, mainly in the coastal areas where tourism pressures are steadily increasing. At the same time, the Mediterranean region is rich in unique and fragile ecosystems which face direct and indirect development pressures. The emerging conditions of climate change aggravate the situation, particularly for the poorest part of the population. In addition to varying degrees of water stress, many Mediterranean countries still suffer from:

- lack of effective operational strategies,
- fragmentation of responsibilities between authorities,
- weak policy implementation and law enforcement,
- weak monitoring and assessment at the national and local
- limited technical, management and implementation capabilities to address water challenges, and
- financial constraints to implement policies.

However, considerable efforts are on-going. Many countries have commenced national programs for providing water and sanitation services to the entire population, enhancing irrigation efficiency, controlling conveyance losses, promoting participatory water management, and protecting and improving water quality. Drought management and climate variability strategies, groundwater management policies, and wastewater reuse plans have also been adopted by some nations. However, a common need and a defined priority across all countries in the region is to make progress on the complex issues of improving water sector governance.

As of the 1990s, most countries in the region started to realize that the 'business as usual' scenario of dealing with water management and water security issues was no longer suitable to cope with future challenges. Following a series of international, regional and national fora, and particularly after the 2nd World

Water Forum (The Hague, 2000) and the Bonn Conference (2001), there is consensus that Integrated Water Resources Management (IWRM) is a means towards achieving sustainable development and that it can contribute significantly towards achieving several of the Millennium Development Goals (MDGs, 2000).

At the World Summit on Sustainable Development (WSSD) held in Johannesburg in 2002, the international community took an important step towards more sustainable patterns of water management by including, in the WSSD Plan of Implementation, a call for all countries to “develop integrated water resource management (IWRM) and water efficiency plans by 2005, with support to developing countries”.

With water crises recognized primarily as a crisis of governance, effective water governance in an IWRM context, is a critically important prerequisite for meeting current and future water challenges at the regional, national and local levels. Water Governance refers to the range of political, social, economic, and administrative systems that are in place to develop and manage water resources and the delivery of water services at different levels of society. It comprises the mechanisms, processes, and institutions through which all involved stakeholders, including citizens and interest groups, articulate their priorities, exercise their legal rights, meet their obligations and mediate their differences.

Water governance depends not only on specific institutions that are mandated to govern water but also on the overall governance context in which water issues are placed in a country. Democratic institutions, access to information, participatory approaches, gender equity, transparency in decision making and accountability are among the key elements for good governance.

The prospects for improved and sustained water reform are also linked to other factors such as macro-economics, demographics, and social and political stability in a country. Political governance deficits and lack of institutional capacity are among key causes of water governance problems. The prescriptions for improved water management in most sectoral strategies (eg. utility restructuring, enforcement of environmental regulations, resource pricing, cost recovery for services, etc) are important but will only have their desired effects when water reform is planned as part of a more holistic set of political, institutional, legal, social and economic changes that include agriculture, industry, energy, tourism, nature conservation, etc.

Overall Mediterranean

In the past decades the countries of the Mediterranean have gone through major changes which had considerable impacts on its water resources. Population growth, economic development, technical transformation, better education, urbanization, excessive development of the coastal areas, environmental degradation and loss of wetlands, demand by customers for increasingly complex services, have, among others, affected how water is exploited, stored, and delivered.

Focus of investment has been directed toward intense development of water infrastructures, including dams, irrigation, drainage

systems, water supply systems, waterpower electricity production, etc. However, institutional and regulatory re-organization to manage these investments and to plan next steps has not been able to adapt as rapidly. In the Mediterranean region, as on a worldwide scale, many countries are currently in a stage of governance reform, orienting priorities and practices towards an IWRM approach.

In the South and East of the Mediterranean, countries are taking such steps. Until now, a few countries have completed their national IWRM plans or are close to and move towards the implementation phase. Many countries are in the process of developing their national IWRM plans while a smaller group of countries are still in the initial phase of preparation. At the same time, many countries should mainstream IWRM considerations, methodologies and practices in the implementation of their investment programmes and application projects at the national, local and transboundary levels.

In the North of the Mediterranean (EU Member States, EU Accession Countries and other Southeastern European countries), the EU Water Framework Directive (WFD) provides the main policy framework for water management, with varying levels of success in the implementation of its provisions among concerned countries.

Regardless of the level of progress achieved until now it is important to encourage and assist, as appropriate, the countries in need in their processes towards integrated management of water resources, including through improved water governance.

Although IWRM provides a framework of principles and good practices for water governance, it is recognized that there is no ‘one-solution-for-all’ at national level. This is mostly due to country particularities, the large number of sectors involved and the complexity of managing and balancing diverse needs and often competing interests. The situation gets even more complex when it comes to effective management of shared water resources, particularly since it often involves national sovereignties. Nevertheless, it is widely recognized that there is a wealth of valuable experiences to share at the regional, sub-regional and national levels and ground for a common strategic planning.

Despite country variations, most water reforms typically include components linked to:

- Promoting principles of integrated water resources management including watershed management approaches,
- Clarifying institutional roles and responsibilities,
- Decentralizing of water decision making,
- Increasing stakeholder participation,
- Promoting financing innovations.

In general, though development of strategies, plans and legislation are progressing in most of the countries in the region, policy implementation and law enforcement remains slow in many of them. Moreover, despite the obvious negative impact of corruption on water resources and services, remedial anti-corruption measures are not being adequately addressed in water reform.

North Africa

North Africa is among the most water scarce areas in the world. Most countries have mobilized almost all available water resources (surface, groundwater, desalination). In the last few decades, countries have responded to the scarcity by investing in infrastructure, also with assistance by international donors. Water supply coverage has increased remarkably particularly in urban areas, though quality service to the urban poor needs to be improved. Considerable part of the rural and peri-urban areas remains poorly served.

During the last years and particularly after Johannesburg, countries of North Africa have been actively reviewing their policies and legislations. Most countries have rationalized and consolidated responsibilities on water aspects and made one Ministry responsible for water planning, legislation, investments, and some water related-services. Water resources management can be the responsibility of Ministries of Irrigation (Egypt), Agriculture (Tunisia) or of a more umbrella Ministry that includes water, environment and other sectors (Morocco). Algeria has a dedicated Ministry of Water. Though water planning, legislation and, often, investment is under one Ministry, other Ministries are in most cases responsible for water supply and sanitation, including service delivery and regulation of the quality of service.

Some countries, applying international approaches of delegating water management at the lowest appropriate level, they have established a system of basin management organizations and have decentralized responsibility for water supply and sanitation to water authorities and municipalities. Some countries have established committees or councils charged with inter-ministerial coordination although decision-making powers of these committees are often weak. Legislation on water quality and protection of the environment exists in most of the countries but its enforcement remains a great challenge. Drought management strategies and action plans have been formulated in Morocco and Tunisia responding to climate change and cyclic droughts.

Stakeholder participation has been introduced in many countries. The preparation of water strategies and IWRM plans assisted in a gradual opening of consultation procedures. Participation of Non-Governmental Organizations (NGOs) and Water User Associations (WUAs) is increasing, particularly in local water management consultations. Egypt, Tunisia and Morocco can also demonstrate participatory experiences with irrigation WUAs.

Public Private Partnerships (PPP) have been developed during the last decade in Morocco and Egypt, especially for major agricultural development projects.

Highlighting current status in the countries of North Africa, particularly related to development of policies, plans and law, we could mention:

- **Algeria** has a National Plan for Water (2005) that was put in place the same year the Water Law was adopted. An Action Plan for implementing the IWRM framework is currently under preparation. A river basin management approach is in place since 1996.
- **Egypt's** National Water Resources Plan (NWRP, 2005)

corresponds to an IWRM Plan. The NWRP is a comprehensive document developed over six years with stakeholder involvement. The implementation framework for it is currently under preparation. Moreover, a National Master Plan targeting specifically the Water and Wastewater Sector of Egypt is in the process of getting finalized.

- **Libya** has a National Strategy for Water Resources Management 2000-2025 (1999), which sets the general platform for the national water policy. The legal framework includes an obligation to elaborate an IWRM Action Plan/Strategy.

- **Mauritania** follows a national water policy since 1998 and adopted a Water Act in February 2005. The Water Act makes direct reference to IWRM principles and addresses the ownership of water. An IWRM Action Plan is not in place yet, but its elaboration is clearly foreseen in the on-going Action Plan 2006-2010. Although legislative and institutional frameworks are in place for full IWRM implementation, the country encounters several challenges that hinder it.

- **Morocco** follows a river basin management approach (established by law already since 1995) and has elaborated Master Plans of Integrated Water Resources Development for River Basins (PDAIRE). The country has recently (2007) finalized a National Water Plan to serve as an IWRM Plan, through a national consultation process structured on thematic priorities.

- **Tunisia** adopted a long term Strategy for the Water Sector in 2003 and is currently in the preparation process for producing an IWRM Plan. Responsibility of local water management is decentralized in 23 financially autonomous public provincial (rather than watershed) offices.

Middle East

Middle East has been suffering for decades by political tensions and conflicts, many of which are armed and without easy solution. These have caused major socio-economic and environmental problems, including growing pressure on already fragile and scarce water resources, important part of which are transboundary. Pressure on resources, including due to overuse of shared ground water aquifers, leads to water conflicts and raises the issues of water rights. Failure to resolve the situation has been limiting potential for sustainable development in the area, including effective water management. The environmental impacts caused by conflict include physical damage to infrastructure -though prohibited by international agreements- and serious contamination due to release of hazardous substances from destroyed industrial and military infrastructure. Substantial investments are needed for rehabilitation and restoration of such damaged facilities.

As in North Africa, in most countries, key responsibility on water lays in one Ministry like for Irrigation (Syria), Energy and Water (Lebanon), Environment (Turkey), Infrastructure (Israel) or in a Water Authority (Palestine).

Most countries have mainstreamed water and environmental issues in national strategies. Some of them have been devising and gradually implementing mechanisms for cross-sectoral coordination at multiple levels. Only very few countries have

been formulating structured capacity building and water target monitoring programmes. However, implementation and enforcement have not kept pace with the increased water demand, water shortage and imbalance with deteriorating water quality and draw-down of groundwater surface. A serious constraint is that, in most countries, the executing agencies have no means to control illegal well construction or groundwater use and pollution.

A number of countries have started to decentralize management and services at the watershed level (Lebanon, Turkey) while stakeholders participation has been introduced in some countries.

PPP, particularly in operation and maintenance of the water supply and sanitation systems, has met some success (Jordan). At the same time, revenue generation and operation efficiencies have increased in only a few countries.

Highlighting current status in the countries of the Middle East, particularly related to development of policies, plans and law, we could mention:

- **Israel** has a Water Law in place since 1959, which establishes the framework for the control and protection of the country's water resources. Numerous regulations have been promulgated pursuant to the Water Law. In 2000 Israel decided to act according to the principles of IWRM in order to face and overcome a looming and lasting water crisis, while one year later the water legislation shifted towards privatization with the Water and Sewage Corporation Law of 2001.

- **Jordan** has a Water Strategy (1997) and Water Policy (2003) in place as well as a National Water Master Plan (2003) that corresponds to an IWRM Plan.

- **Lebanon** has a Work Plan 2000-2009 (for the account of the Ministry of Energy and Water, 1999). The Work Plan includes elements of an IWRM Plan, but it is focused on domestic water supply and is lagging behind in implementation. The water administration has been re-organized towards a watershed management (21 water authorities were consolidated into 4) and steps are taken for operationalizing the scheme.

- **Palestinian** Authority has a National Water Plan (2000), a Water Law (2002) and an Integrated Water Management Plan for West Bank and Gaza (2003) that corresponds to an IWRM Plan. Water regulation is under further development. Public Private Partnership is still at early stages of implementation in Gaza and is facing a lot of restrictions.

- **Syria** has Water Strategy (2003) in place, following a 2000 Water Sector Analysis, prepared by the Ministry for Irrigation. The Water Strategy entails provision for elaborating an IWRM Plan. A Water Law was ratified in 2007 introducing consolidation of the water-related public entities. Independent water directorates at the basin level have been established and responsibility for water supply and sanitation has been decentralized to water authorities and municipalities.

- **Turkey** has a number of laws and plans though there is no evidence of an IWRM plan in place. Turkey is an EU Candidate

Country and gradually tries to abide to principles and conditions of the EU Water Framework Directive.

European Union

Water and water pollution were among the first environmental concerns in the EU. The first pieces of EU water legislation were accepted by the European Council as early as 1973. Since then, European water legislation has taken a leading and innovative role in the design of national water policy in many EU Member States.

The current EU water policy recognizes the following overarching principles: High level of protection, taking into account the diversity of situations in the various regions of the Community; Precautionary principle; Preventative action; Rectification of pollution at source; Polluter-pays principle; Integration of environmental protection into other Community policies e.g. agriculture, transport and energy; Promotion of sustainable development.

These principles are reflected in the EU Water Framework Directive. Placing these principles at the centre of water policy has major implications for further policy development and implementation, including:

- the development of integrated policies for the long-term sustainable use of water, and its application in accordance with the principle of subsidiarity;
- expanding the scope of water protection to all waters: surface waters, including coastal waters, and groundwater;
- achieving "good status" for all waters by a certain deadline, and preserving such a status where it already exists;
- water management based on river basins, with appropriate co-ordination provisions for international river basin districts;
- setting prices for water use, taking into account the principle of cost recovery and in accordance with the polluter pays principle;
- encouraging greater participation by citizens; and
- streamlining legislation.

The WFD sets deadlines for individual requirements. For instance, River Basin Districts and authorities had to be identified by 2003, in 2006 the monitoring network had to be established and public consultation to be started, River Basin Management Plans have to be presented by the end of 2009, pricing policies need to be implemented by 2010, and Programmes of Measures are to be made operational by 2012. Ministries for Environment, in most countries also responsible for other issues (infrastructure, sustainable development, agriculture, etc) are responsible for water management.

The implementation of the WFD raises a number of shared technical challenges for the EU Member States (MS). In addition, many of the European river basins are international, crossing administrative and territorial borders; therefore, a common understanding and approach is crucial to successful and effective implementation of the Directive. For this reason, the MS, Norway and the Commission agreed on a Common Implementation Strategy (CIS) for the WFD only five months after the entry into

force of the Directive. The main aim of the CIS is to allow a coherent and harmonious implementation of the WFD with a focus on methodological questions promoting a common understanding of the technical and scientific implications of the WFD.

The main costs (apart from administrative costs) for implementing the WFD relate to an appropriate monitoring system, wastewater treatment beyond the provisions of the Urban Waste Water Treatment Directive, compliance with the Integrated Pollution Prevention and Control Directive and compliance with new standards and requirements on the priority substances list. Moreover, the real cost impact of the WFD depends on the extent to which a country has already embarked on the charging of water costs in alignment with the financial costs, or even taking into account true environmental and resource costs.

The first stage in the implementation of the WFD was concluded in 2007 with mixed results. On the positive side, all MS have made significant progress since the Directive came into force and most of them were able to report in time. The implementation has also brought new impetus to water management and significant progress e.g. restructuring of administrations, compilation of information and assessments, public awareness raising campaigns is observed in most MS. A good starting point for preparing river basin management plans was also provided. Finally, some international cooperation on implementing the WFD between MS and also with some neighboring countries is inspiring and encouraging.

On the negative side, there are a number of significant shortcomings in the implementation. In particular the legal transposition of the Directive into national law is still poor and in some cases inadequate. Moreover, in general, insufficient data has prevented MS to present a conclusive risk assessment for a large percentage of water bodies. Still, a significant number of water bodies have been identified as at risk in all MS. Furthermore, there are some MS where there appears to be a problem with the WFD implementation resulting in significant delays. Effort is made by all countries to fully abide and respond to the provisions of the WFD with the next important target been the preparation of river basin management plans by the end of 2009).

Southeastern Europe

The legal and institutional frameworks in many SEE countries are currently under revision. A major driving force is the prospect of EU accession. In that context, the WFD provides a suitable framework for water management for many countries of the SEE. Major difficulties and gaps still exist, mostly in implementation of policies and enforcement of legislation. Full approximation to EU standards will need further major reforms, time, and extraordinary efforts by national and local administrations, along with adequate resources. In addition, the EU *acquis communautaire* does not affect all SEE countries at present and definitely not at the same level and with the same urgency. Cooperation leading to shared benefits in the SEE is linked to the reform processes at the national level that are needed to provide the basis for integrated and sustainable management of water resources.

Challenges at the national level that need to be addressed include:

- A more effective approach by legal frameworks for the management of natural resources consistent with EU standards;
- The design and adoption of a combined nexus of management instruments, integrated with development and economic policies, and coupled with efficient monitoring and enforcement mechanisms;
- The development of clear and applicable procedures that will ensure public awareness and balanced participation in decision making;
- The establishment of rational and operational decentralization that will allow efficient involvement of local communities, as well as enhance the possibility for cross-border cooperation at the local level;
- The establishment of appropriately-scaled management institutions with clear competencies over natural resources management, along with continuous improvement of their capacities and coordination;
- The improvement of the human capacity to plan and implement Integrated Water Resources Management at basin level;
- The development of mechanisms that will facilitate sustainable financing of natural resources management in accordance with the "user" and "polluter pays" principle, consistent also with socio-economic realities at the local level.

Highlighting current status in the countries of Southeastern Europe, particularly related to development of policies, plans and law, we could mention:

- **Albania** has a Water Strategy (2004). Albania has signed the Stabilization and Association Agreement with the EU (2006), is a Potential EU Candidate Country.

- **Bosnia and Herzegovina** has an outdated Water Management Master Plan (1994) and is in progress of drafting a Water Protection Strategy. Bosnia and Herzegovina has started negotiations for Stabilization and Association Agreement with the EU (2005), is a Potential EU Candidate Country.

- **Croatia** has a National Water Protection Plan (1999) and is preparing a Water Management Master Plan. Croatia has signed the Stabilization and Association Agreement with the EU (2005), is an EU Candidate Country.

- **Montenegro** has become an independent country in May 2006. The country has a new Water law (2006). It has signed the Stabilization and Association Agreement with the EU (2008).

- **Serbia** has a Water Resources Master Plan (2002). Serbia has started negotiations for a Stabilization and Association Agreement with the EU (2005), is a Potential EU Candidate Country.

3.2. Integrating the Climate Change Dimension into Water Resources Management

With increasing evidence of changing climatic conditions in the planet, it is now widely recognized that mitigation alone will not be sufficient to address the challenge posed by increased climate variability. Adaptation measures are therefore needed as a complementary approach.

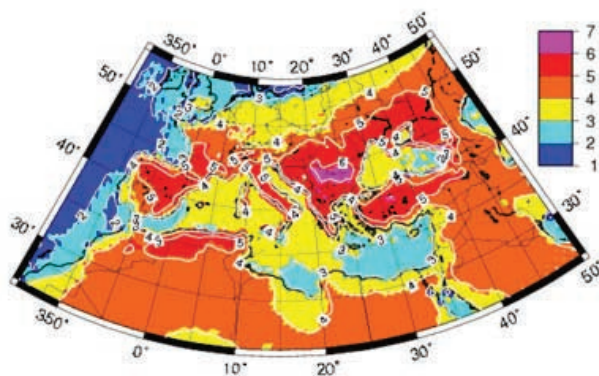
Climate change affects the quantitative and qualitative status of water resources by altering hydrological cycles and systems which, in turn, affect the intensity and frequency of floods and droughts; water availability and demand; water quality and parameters critical for ecosystems such as temperature and nutrient content. Changes in the aforementioned variables lead also to impacts on the socio-economic and environmental goods and services. In this context, water management will become increasingly difficult.

Hydrological variability and extremes are indeed the main challenge of maintaining water security. This will require significant adaptation, which in turn implies the application cluster of measures and practices not easy at all, particularly for countries that lack the infrastructure and institutions to store, manage, distribute and deliver water resources. Water demand will also be affected through the expected increase in migration of people from water scarce regions.

In regions particularly hit by global warming, the sound management of water resources is of utmost importance to ensure equitable access as well as its integration with adaptation strategies aimed at enhanced communities' resilience. This is especially true for the Mediterranean, which will be and is already amongst the regions of the world most affected by climate change and where impacts on water resources become immediately visible.

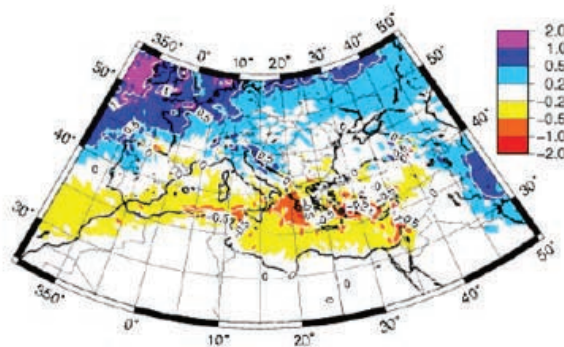
Figure 9 : Climate change in the Mediterranean: IPCC projections

Figure 9.1: Surface air temperature (iC): 2070-2099 vs. 1961-1990; Summer



Source: Somot & al.

Figure 9.2: Seasonal precipitation (mm/d): 2070-2099 vs. 1961-1990; Winter



Source: Somot & al.

Climate change impacts in the Mediterranean: one region, multiple challenges

Overall Mediterranean

In the Mediterranean region, the consequences of climate change are forecasted to be particularly severe, increasing the already existing water stress in most parts of the region, including in Southern and Southeastern Europe, North Africa and the Middle East.

Phenomena such as recurrent and persistent droughts, high variability in precipitation, serious decrease of soil moisture, river flow decrease, extreme weather events, desertification, etc. are expected to increase significantly in the region and will impact on freshwater availability in terms of quantity and quality. Other serious effects of warming in the Mediterranean could be sea level rise resulting inter alia in land erosion and salt water intrusion in coastal areas, thus in the loss of inhabitable and arable land as well as serious alterations of natural habitats and damages in important ecosystems.

Water resources being already scarce throughout the whole region, in combination with increased water demand due to demographic pressure and urbanization, tourism and development needs in general, climate change is likely to lead to further environmental degradation jeopardizing directly or indirectly social cohesion, well being and quality of life as well as food and overall security in the immediate future.

North Africa

In North Africa, as more generally in Africa, vulnerability over water and climate change is very high. Climate change impacts on water are projected to intensify challenges that populations are already facing in overcoming poverty and ensuring their livelihoods and development. The situation is expected to increase competition over water resources for agriculture, domestic use, tourism, etc. and to aggravate health issues, thus likely to exacerbate migrations and creating important risks of conflicts over water in the region and outside.

The consequences of climate change that North Africa is likely to suffer are: more and more severe droughts, significant reductions (of the order of 50%) in run-off and stream flow and less soil moisture, due to decreases in rainfall and higher temperatures leading to higher evaporation, aridity and desertification.

Moreover, in the Maghreb, agriculture is dominated by non-irrigated, small-scale farms the modernization of which is not fast enough to feed growing populations. Thus, increasingly frequent droughts in North Africa may force governments to import more food, placing their economies under severe strain unless global warming is checked. North Africa is particularly exposed to water shortages.

It is also expected that the already massive extraction of “fossil” water from non-renewable aquifers (notably the Nubian Sandstone Aquifer and the North Sahara Aquifer) will continue giving rise to a wide series of secondary problems. Furthermore, according to four IPCC models, groundwater recharge will decrease dramatically – by more than 70 percent – between now and 2050 along the southern rim of the Mediterranean. Algeria and Tunisia are also vulnerable to natural hazards such as floods and, together with Morocco, could also be partly affected by sea level rise.

Middle East

The Middle East is also one of the regions most vulnerable to climate change, on account of water scarcity, a significant dependence on climate-sensitive agriculture, high population density and economic activity in flood-prone urban coastal zones, and the presence of conflict-ridden areas in which climate-induced resource scarcity could escalate conflicts, violence and political turmoil.

Most climate scenarios agree that the region will suffer a decrease in water availability (expressed as runoff) of up to 40mm per year with important shifts in precipitation patterns and increased evapotranspiration. This will highly affect the region’s crops, such as rice, citrus fruits, sugar beet, which rely for up to 80 percent on irrigation (e.g. Egypt, Lebanon, Jordan). A temperature increase of 3-4 degrees Celsius could cause crop yields to drop by 25-35 per cent, according to FAO.

Snowfall and in particular snow cover in high mountains might change and are expected to decrease with hydro-geological, ecological and economic consequences.

Unless adequate and urgent action is taken to reduce vulnerability to climate change, the sub-region will be exposed to large economic and social risks and will put further pressure on groundwater, which is currently being extracted in most areas beyond the aquifers’ recharge potential.

Competition for water within the region and across its borders may grow, carrying the risk of conflict. Some parts of the region, notably the Nile Delta are particularly vulnerable to flooding from rising sea levels.

Southeastern Europe

In Southeastern Europe, economic activities depending on water availability such as agriculture, tourism, industry, energy will be adversely affected, since increased climate variability will threaten

inter alia infrastructures, waterways, hydropower, crop yields and timber harvests as well as recreational environments.

River flood hazards, especially flash floods, across much of Southeastern Europe will increase even further, endangering settlements, infrastructures and waterways, hence requiring significantly more investment in flood control and water management in the region, especially at the river basin level. The expenditure for flood protection works, storm water drains etc. will rise significantly.

In some countries of the Western Balkans – such as Albania, Bosnia and Herzegovina and Serbia –, which are heavily depending on hydropower for electricity supply, decrease in precipitation and shorter periods of snow cover in the mountains and hence in river flow and run-off will provide further challenges to already stressed national and regional energy security.

In the coastal zones of the Adriatic shoreline, the risk of flooding, erosion, and land loss (due to storminess and sea-level rise) will grow substantially with implications for human settlements and coastal natural habitats. This represents a major threat to important ecosystems (especially wetlands), and natural landscapes vital for biodiversity. In combination with increasing temperatures and heat waves, this could also become a major concern for tourism development in the region.

Mediterranean countries of the European Union

Southern EU countries will not be spared from climate change. The average run off in southern European rivers is projected to decrease due to increasing temperature and decreasing precipitation. In particular, some river basins in the Mediterranean, which already face water stress, may see marked decreases of water availability.

Major drought episodes are projected to become more frequent with particularly intense summer droughts. This may be further exacerbated because of an increasing demand for water as a result of elevated temperatures. Worst hit will be Cyprus, Malta, Greece, Italy (South) and Spain with an increase in frequency and severity of droughts and water scarcity. Heat waves could affect tourism activities as well as people’ health and enhance energy consumption for cooling purposes. Decreased precipitation and run-off will moreover be an issue for hydropower generation.

Mediterranean Europe has been suffering major damaging floods in the recent years. Although the floods cannot be attributed to global climate change alone - since changes in river management, the increased urbanization of former floodplains and deforestation of upstream mountainous areas already affect flood generation -, an increasing risk of flooding in the region is expected under climate change and the shortening of the stay of snow cover in the mountains.

In the coastal areas where the pressure on water demand is already very high due to agriculture and tourism, the reduced availability of surface water during dry periods and the reduced groundwater recharge will increase the pressure on groundwater considerably. Many of the groundwater aquifers are already heavily abstracted and over-exploited, and some will not be

suitable as drinking water because of saline intrusion exacerbated by rising sea levels. Even aquifers that are currently managed in a sustainable manner might need a considerable reduction in water abstraction.

Sea-level rise and potential increases in the frequency and/or intensity of extreme weather events, such as storms and associated surges, are additional pressures. The island states of Malta and Cyprus, in addition to the currently experienced severe water scarcity, are particularly at risk also from sea level rise with a number of sites under a high vulnerability index. In addition to aforementioned pressures, increased immigration trends from neighbouring countries, especially the southern rim of the Mediterranean, may exacerbate the water supply-demand gap and impact on social peace.

Current processes and recent developments relevant to adaptation and water resources management in the Mediterranean

Multilateral processes

The main **Multilateral Environmental Agreements (MEAs)** addressing climate change issues are mentioned below:

- **The UN Framework Convention on Climate Change (UNFCCC)**, which sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It enjoys near universal membership, with 192 countries having ratified. It entered into force in 1994. Under the Convention, governments gather and share information on greenhouse gas emissions, national policies and best practices; launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; cooperate in preparing for adaptation to the impacts of climate change.
- **The Kyoto Protocol**, an international and legally binding agreement to reduce greenhouse gases emissions worldwide, adopted at the third Conference of the Parties to the UNFCCC (COP 3) in December 1997 and that entered into force in 2005.
- **The UN Convention to Combat Desertification (UNCCD)**, adopted in Paris in 1994 with the aim to promote effective action against desertification through innovative local programmes and supportive international partnerships. Two additional MEAs with relevance to climate change and water resources management in the Mediterranean region may be cited:
- **The Barcelona Convention** framework under which the **Blue Plan**, a Regional Activity Centre of **UNEP's Mediterranean Action Plan**, is currently preparing a regional study on "Energy and climate change in the Mediterranean", with the financial support of the European Investment Bank.
- **The UN ECE Water Convention**, under which a **Task Force on Water and Climate Change** has been established recently

(Bonn, 22-23 November 2007) that aims notably to prepare a Guidance Paper.

Recent developments

Major milestones in the development of international policies and strategies with regard to climate change and water resources are as follows:

- **The Intergovernmental Panel on Climate Change (IPCC)**, a scientific intergovernmental body was set up by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) in 1988 and obtained the Nobel Prize for Peace in 2007, released the consolidated Synthesis of its **Fourth Assessment Report (AR4)** at its 27th Session in **Valencia (November 2007)**.
- Conference on **International Solidarity for a Strategy on Climate Change in Africa and in the Mediterranean Region**, **Tunis, 18-20 November 2007**

The Action Plan adopted at the Tunis Conference lists a number of actions recognized as necessary for the successful management of water resources in the countries of the region: improved data collection and monitoring systems; promotion of technology transfer for analysis, risk assessment and adaptation of the infrastructure needed for managing water resources; development of water saving and re-use programmes. This can only be achieved with the help of developed countries, based on the principle of common but differentiated responsibilities.

- **EU-Africa Summit, Lisbon, 8-9 December 2007**
The Lisbon Declaration refers to climate change as one of the "key political challenges of our time".
- **Euro-Med Water Directors Conference, Bled, Slovenia, 11-12 December 2007**
In the Bled Declaration, the Water Directors of the Euro-Mediterranean countries welcome the initiative to organize a Euro-Mediterranean Ministerial Conference on Water and recommend "Addressing Water and Climate Change through adaptation measures together with mitigation, with emphasis, inter alia, on management of droughts and floods and combating desertification" as one of the key themes for the Ministerial Conference.
- **United Nations Climate Change Conference, Bali, 3-14 December 2007**

The conference culminated in the adoption of the Bali Road Map, which consists of a number of forward-looking decisions aiming at reaching a secure climate future the decision on future cooperation under UNFCCC, notably the launch of the Adaptation Fund.

- **15th Ordinary Meeting of the COP to the Barcelona Convention, Almeria, January 2008**

The Almeria Declaration stresses the importance of taking into account climate change and its adverse effects "on

coastal and marine ecosystems and the environment in general and the negative consequences for sustainable development, particularly for developing countries in the Mediterranean basin”.

Funds established under MEAs

The funds that are managed by the GEF (SPA, LDCF and SCCF) available for adaptation projects currently are about US\$ 275 million and include:

- **The Strategic Priority on Adaptation (SPA) Trust Fund**
The GEF, as an entity entrusted to operate the financial mechanism of the UNFCCC, established the Strategic Priority on Adaptation (SPA) under its Trust Fund. The objective of the SPA is to reduce vulnerability and to increase adaptive capacity to the adverse effects of climate change in the focal areas in which the GEF works. The SPA supports pilot and demonstration projects that address local adaptation.
- **The Special Climate Change Fund (SCCF)**
The SCCF aims at supporting activities in the following areas: (i) adaptation, (ii) technology transfer, (iii) energy, transport, industry, agriculture, forestry and waste management, and (iv) economic diversification. Adaptation activities to address the adverse effects of climate change have top priority for funding under the SCCF.
- **The Least Developed Countries Fund (LDCF)**
The LDCF was established to support a work programme to assist Least Developed Country Parties (LDCs) carry out, inter alia, the preparation and implementation of national adaptation programmes of action (NAPAs). Mauritania is among the countries having submitted their NAPA.
- **The Adaptation Fund under the Kyoto Protocol**
The Kyoto Protocol Adaptation Fund will be financed from the share of proceeds of the clean development mechanism (CDM) and other sources. It could receive US\$ 80-300 million per year for the period 2008–2012.

Some funding is also available under other Multilateral Environmental Agreements (MEAs) whose areas of work could be synergetic with adaptation, including the Convention on Biological Diversity (CBD), the **UNCCD** and the **Ramsar Convention** on the conservation of wetland resources.

Regional and sub-regional initiatives

Currently, several adaptation-relevant initiatives and programs are ongoing or proposed for the near future. They have contributed or are expected to contribute to building adaptation capacity in the countries around the Mediterranean, with a special emphasis on the south and east of the region. The list below is not exhaustive but it is meant to shed the light on some of the important adaptation relevant initiatives in the Euro-Mediterranean region.

European Union

The EU Commission has identified Southern Europe and the entire Mediterranean region as being among the most vulnerable areas especially in matters of climate change impacts on water,

which will make them even more prone to **water scarcity and drought**. It has presented a **Communication** (July 2007) in the related field that stresses the importance of sustainable water demand management including water-saving policies and water efficiency optimisation throughout Europe.

While the main text of the Water Framework Directive (WFD) does not explicitly address climate change, it is well suited to handle the long-term implications of climate change with its step-wise and cyclical approach. Implementing the Directive requires assessment of the impacts of climate change on the reference conditions of water bodies and on the cost effectiveness of water management strategies. In fact, under the Water Framework Directive a group of experts is developing a guidance document about how to adapt to climate change with regard to water issues and EU water legislation that will be ready at the end of 2009.

There are other relevant EU policy instruments. The proposed **Directive on the Assessment and Management of Floods** complements the WFD by specifically addressing flood risks which are affected by climate change. Similarly, the proposed **Marine Strategy Directive** also provides an overall framework for developing marine strategies that could take into account and enable adaptation to the impacts of climate change. The **Maritime Policy Green Paper** recognizes climate change as a major threat, and discusses adaptation to changing coastal risks in Europe.

The EU, as the largest provider of Official Development Assistance (ODA), has also taken a lead role in international development efforts and ambitious commitments. In this context, the EU has highlighted the strong links between climate change and poverty and it has also been suggested that dialogue and partnerships on adaptation should be enhanced with developing countries, which need to face the impacts of climate change in addition to their development burden. This was reiterated at the **G8 Heiligendamm Summit** in June 2007, where adaptation was again recognized as a priority area for cooperation with developing countries.

In this context, the EU has launched the **EU Water Initiative (EUWI)**, the **Mediterranean Component (MED EUWI)** of which is designed to contribute to the achievement of the Millennium Development Goals (MDGs) and WSSD targets for drinking water and sanitation in the Mediterranean, within the framework of an integrated approach to water resources management.

Also as part of the support of the European Union for the development of the water sector in the countries of the south and east Mediterranean under the MEDA Regional Indicative Programming, the **Euro-Mediterranean Regional Programme for Local Water Management (MEDA Water Programme)** has funded 9 projects of which a number address indirectly climate issues, such as i.e. the MEDROPLAN project on Improving drought preparedness, the ADIRA project that explores the introduction of autonomous desalinization programs or the IRWA project on improving irrigation water management.

Moreover, the **EU Common Foreign Policy and Security Policy** could play an important role in reinforcing the EU's capacity to prevent and deal with conflicts arising over access to natural resources, including water, and natural disasters accentuated by climate change, as well as their potential consequences such as forced migration and internal displacements of persons.

In this context, the EU will continue to promote adaptation within the UN Framework Convention on Climate Change (UNFCCC). Inclusion of adaptation measures in geographical programming is therefore to be strengthened in the framework of the **2004 EU Action Plan on Climate Change and Development**, under the Environment and Natural Resources Thematic Programme. At the European Council in June 2008, it was further mentioned that the EU “will work for the effective implementation of the **2007 Global Climate Change Alliance** (see EU Commission’s Communication of 18 /09/2007) and (that it) will explore ways to mobilize new financial resources to tackle climate change and combat its negative impact”. In this context, the EU would work, **inter alia**, on a global financing mechanism. Close links should also in particular be developed with Africa through an **Africa-EU Partnership on Climate Change**, taking into account major related international instruments such as the UN Framework Convention on Climate Change (UNFCCC) and the UN Convention on Combating Desertification (UNCCD).

In the aftermath of the last year’s **Bali Climate Conference**, the EU is committed to maintaining international leadership on climate change and energy with the ambitious objective to secure a global and comprehensive post-2012 agreement on climate change at Copenhagen in 2009 consistent with the EU’s 2°C objective.

With regard to neighbouring countries, it has been proposed that “climate-proofing” measures/ projects be supported by the **European Neighbourhood Partnership Instrument (ENPI)**, in the framework of the European Neighbourhood Policy. It furthermore offers opportunities for funding adaptation under the Thematic Programme for Energy and Environment (ENRTP) and the ENPI national and regional programmes. The ENPI could also serve as a financing source for initiatives under the Africa-EU Partnership on Climate Change.

North Africa and Middle East

Under the **GEF SPA** and the **SCCF** following concrete planned or ongoing adaptation projects are funded in the broader region:

- **Coping with Drought and Climate Change (regional)** This Strategic Priority on Adaptation funded project, aims to develop and pilot a range of coping mechanisms for reducing vulnerability of farmers and pastoralists to future climate shocks. Components include piloting coping strategies, improving early warning systems, developing drought plans and integrating climate change/drought across sector policies.
- **Community-based Adaptation (CBA) Programme, (global, including Morocco)** This project is aimed at: (i) developing a framework, including new knowledge and capacity, that spans the local to the intergovernmental levels to respond to community-based adaptation needs; (ii) identifying and financing diverse community-based adaptation projects in selected countries; and (iii) capturing and disseminating lessons learned at the community level to all stakeholders, including governments.

The World Bank has also committed to assist developing countries in their efforts to address the climate challenge through a variety of analytical tools and of financial services including the Proposed

Climate Investment Fund. To support Middle East and North African (MENA) countries in their adaptation and mitigation efforts, the World Bank Group is currently drafting the **MENA Regional Business Strategy to Address Climate Change**, by fully integrating the objectives of reducing climate change induced vulnerability and GHG emissions into the Bank’s development assistance to the region. The proposed business plan is organized around the two following dimensions:

- the World Bank projects (IBRD and IDA) that will serve as “vehicle” to deliver the mitigation or adaptation assistance;
- the additional activities that would help the countries reduce GHG emissions or enhance their resilience to climate change.

The **MED-HYCOS**, the Mediterranean component of the **World Hydrological Cycle Observing System (WHYCOS)** project aims to provide information to improve efficient management of the world’s water resources. It is based on a series of regional projects providing technology and training to monitor hydrological parameters (rainfall, riverflow and evaporation) in the world’s river basins.

There are a number of **regional initiatives for better water resource management** that will facilitate the adoption of appropriate adaptation measures, for example the **Africa Water Vision for 2025**.

Other **projects, initiatives or institutional activities ongoing in the broader region** with regard to climate change include notably:

- the **Consultative Group on Agriculture Research (CGIAR)’s “Climate Change Challenge Programme”**;
- the **Assessments of Impacts and Adaptations to Climate Change (AIACC)**, conducted in collaboration with the UNEP/WMO and IPCC and funded by the GEF, to advance scientific understanding of climate change vulnerabilities and adaptation options in developing countries;
- the **IDRC Climate Change Adaptation Support Programme for Action-Research and Capacity Development in Africa (CCAA) programme** (five-year, \$65 million) in partnership with DFID, to support African countries in their efforts to address vulnerability, particularly of the poor, to climate change;
- the **Linking Climate Adaptation network (LCA)**, funded by DFID, which is an effort to help communities, policymakers, practitioners and academicians share knowledge on climate change adaptation;
- the **New Partnership for Africa’s Development (NEPAD)**, an African-led strategy for sustainable development and poverty reduction in Africa. NEPAD is a long-term agenda for Africa adopted as a programme of the Africa Union;
- the **Sahara and Sahel Observatory (OSS)** work programme in arid, semi arid and sub-humid areas in North, West and East Africa, including long-term observations and networks focusing on land degradation issues and the identification and collection of a number of biophysical indicators to help to assess three sub-regions (North Africa, Sahelian Africa

and Eastern Africa) needs and vulnerabilities to climate change and thus identify potential action for adaptation;

- the **Centre Régional Africain des Sciences et Technologies de l'Espace en Langue Française (CRASTE-LF)**, a training and research institute established under United Nations sponsorship to promote the utilization of space science and technology and develop related national and regional capacity.
- the **TICAD4 cooperation scheme between Japan and African countries**, which is dedicated to environmental issues and climate change (coopération entre le Japon et l'Afrique) consacrée aux questions environnementales et changements climatiques dont les principaux points évoqués sont les suivants :
- the **Human Security Network**, an international initiative currently under the chairmanship of Greece, which has chosen to focus its activities on the human security implications of climate change with emphasis on its impact on the vulnerable population groups of children, women and persons fleeing their homes due to climate change as well as to the adaptation opportunities.

Bilateral cooperation

Following up on the adoption of the **Declaration on Integrating Climate Change Adaptation into Development Co-operation** by the OECD Development and Environment Ministers in April 2006, OECD member countries have engaged, jointly with partner countries, into a process to mainstream adaptation into development activities.

Progress has so far been achieved in raising awareness on the importance of integrating climate change into development activities through analytical work, the conduction of training courses and seminars, the development of websites, dialogues with partner country authorities and other initiatives to disseminate relevant knowledge and experiences.

There is now also significant high-level policy endorsement, with initiatives ranging from agreements with broader environmental and development objectives to climate change initiatives combining mitigation and adaptation approaches and more rarely agreements dealing specifically with adaptation. The development and implementation by bilateral donor agencies of operational measures aiming at integrating adaptation considerations into development activities however is still at an early stage and considerable efforts need still to be made to advance further the agenda.

Among the bilateral cooperation/assistance initiatives currently underway in the Mediterranean region, the following are worthwhile to be cited:

- The support provided by the **German BMZ/GTZ** to the **Tunisian Government** for the preparation and the implementation of the **National Climate Change Adaptation Strategy**;
- The work undertaken by Tunisia to mainstream climate

change into the implementation of the UNCCD with the support of **BMZ/GTZ**;

- The **Lake Nasser project** for the **development of a planning support system** to analyse management for Nile inflows and releases in the context of climate change, funded by the **Netherlands** through their Embassy in Cairo.

3.3. Water Demand Management and Non-Conventional Water Resources

The challenges of poverty and hunger remain as great and compelling as ever. The number of the world's under-nourished is still on the increase, despite the remarkable progress made in agricultural development. Increasing food production to meet the basic needs of the increasing world population on a sustainable basis remains the primary goal of all nations.

In this context the importance of irrigated agriculture needs no emphasis. Currently, production from the irrigated lands, which constitute about 20 percent of the total arable lands, accounts for 35 percent of the global food harvests. Irrigation has the ability not only to increase production per unit area of land but also to stabilize production. Indeed many countries will look to irrigated agriculture as the only reliable means to increase production on a sustainable basis.

Nowadays, a growing realization that an increasing number of countries are approaching full utilization of their conventional water resources and that the quantity of good quality water supplies available to agriculture is diminishing. What is left is water of marginal quality such as saline groundwater and drainage waters. More attention should be given for using such quality water and its effect on the ecosystem. Moreover, it needs more investigation from the economic point of view.

Access to good quality water in sufficient quantity is fundamental to the daily lives of every human being and to most economic activities.

In a number of countries where food security is no more a challenge, water resources management still remains an issue, in particular in water scarce areas where water is a natural resource requested for economic development. Agriculture, industry, tourism, energy, transport and urban development require good quality water available all the yearlong with seasonal peaks.

Worldwide water is becoming increasingly scarce. In the past times, at least in nondesert areas, water availability was unquestioned. It has been available from surface or groundwater sources and ready to be applied in multiple uses. With increasing population densities on one hand, and environmental degradation on the other, there is an increasing pressure on water and water systems for direct consumption and for productive use.

In a context where changes in climate are expected to worsen the trend, where drought episodes will become more frequent with an

increased intensity, effective strategies should be devised taking into consideration the prioritization of uses (leisure activities, e.g. tourism, golf and swimming pools vs. basic need e.g. drinking water and healthy freshwater ecosystem).

It is no longer possible to simply satisfy all water demands by increasing the supply; there is little potential for developing new resources or increasing current ones. Non conventional resources represent alternatives options; however scrutinized assessment should be considered beforehand in order to avoid any incompatibility.

Challenges

1) Demand vs Supply

Water management strategies have always focused on developing new supplies to satisfy the ever-increasing demand from all sectors and on building the infrastructures to convey and distribute these supplies to the different users. Till recently, very little attention was given to reduce the demand or improve the water quality. Almost all the supplies have been developed in the water scarce countries. Quality management seeks to maintain the usability of resources by controlling pollution. Environmental protection has become the focus of water management in many countries. However, preserving the ecology of the water resources system should not prevent its development for the benefit of the other sectors. A compromise can easily be reached if the spirits of cooperation prevail during the planning and management activities.

As presented in Part I, the Mediterranean water demand has increased twofold during the second half of the 20th century. In 2005, the total water demand was around 280 km³ and 64% was used by agriculture (more than 80% for Southern and Eastern countries), 14% by local authorities for public drinking water networks (including tourism such as swimming pools,...), 7% industry, 15% energy (cooling towers). The water demand in the Mediterranean is expected to increase by 50 km³/year by 2025 to reach some 330 km³/year (Figure 6).

By 2025, the significant increase in pressures on water resources, gauged by the exploitation index of renewable natural water resources, highlights strong and sometimes alarming contrasts (Figure 7):

- a first group of countries, where water abstraction are close or exceed the average annual volume of renewal resources: Egypt, Israel, Jordan, Libya, Malta, Gaza Strip and Syria;
- ;Morocco where the total demand represents a growing share of the average annual volume of renewable resource, but where the exploitation index will stay between 50 and 75% until 2025;
- a third group of countries where the exploitation index lies between 25 and 50% may experience nevertheless local or exceptional stress: Algeria, Cyprus, Lebanon and Tunisia;
- a fourth group of countries where the exploitation index is less than 25%: France, Greece, Italy, Spain, Turkey and Eastern Adriatic.

Regardless of the group a country belongs to, it may face local, permanent or temporal problems of water scarcity. These

problems may also be the result of, and often exacerbated by human activities.

Pressures can also be qualitative. Many aquifers, show excessively high contents of pesticides or nitrates.

2) What does Water Demand Management mean?

Water demand management refers to the implementation of policies or measures which serve to control or influence the amount of water used. Water Demand Management can be a viable management option to complement supply management in alleviating problems of water stress. Fortunately, the demands of most sectors are not absolute, but amenable to management, which should aim at optimizing the return from the various allocations under the expected conditions of scarcity. In this respect, non-engineering demand oriented measures, such as inter-sectoral collaboration, building public awareness and economic incentives will have an important role in order to match demand with available supply.

Demand management addresses three levels of actions:

- i. proper allocation of water use between all uses (economic sectors needs, the environment),
- ii. how water is channeled to users,
- iii. how it is used.

Demand-oriented measures could be classified in one of four main measures; Technical, Institutional, Legal, or Economic.

These measures that can be non-financial (e.g., awareness) or financial (e.g., incentives), and they can also, be mandatory (e.g., regulations) or optional (e.g., market systems)

Demand management aims at reducing and controlling demands and improving water use efficiency. Shifting to less water demand crops for example, by replacing rice by other crops could reduce the demand. Another measure could be the improvement of the efficiency by reducing the losses in the system, which include seepage, percolation and spillage in the agricultural sector and distribution losses of the public water supply network in the municipal sector.

The issue of WDM should always be linked to the long term water resources planning and in particular the IWRM or river basins plans; the efficiency gains mobilized through a number of different measures should be considered in the global balance between demand and supply having in mind the prioritized uses defined at national or basin level.

3) What types of Non-conventional water resources are available?

A number of technologies can be utilized instead of mobilizing new water resources (surface or groundwater). Water reuse, including treated waste water and recycled water, domestic grey water reuse, is an alternative; desalination is another alternative

option as well as rainwater harvesting.

All these alternative solutions must be considered both in terms of sustainability and affordability.

Direct treated waste water reuse concern a number of applications such as irrigation (agriculture, landscape, sport and recreation) or water for manufacturing and construction industry (cooling and process water).

Desalination is another way of producing non conventional resources. Sea water or brackish water can be treated in view of water supply production.

This practically unlimited resource of water requires energy consumption and results to environmental impacts. These impacts are generated mainly from the brine produced during the desalination but also from discharges of chemicals used in the desalination process. Two main categories of commercial processes are developed: thermal and membrane processes. In addition, a number of co-generation hybrid and dual purpose plants are operated in the region; they combine water and power generation sometimes by combining thermal and membranes (hybrid). The use of non conventional energy resources (solar and wind) are being tested on small distillation plants.

4) What is the potential for Water Demand Management policies and non-conventional water resources in the Mediterranean?

Information about the potential water savings in the Mediterranean and the European Union is available through a number of studies performed by the Blue Plan and the European Commission. The results illustrate that water savings would allow significant reduction of water consumption for all uses.

Although the water demands of most sectors are not absolute, the water needs for the conservation of natural freshwater ecosystems and services they provide can be defined and set a benchmark for water exploitation. Ecological flows, water level, quality issues, etc. are to be taken into consideration.

Today, in the Mediterranean, the various losses due to transport, leaking and the various uses could exceed 100 km³/year. According to the Plan Bleu study, the improvement of water demand management would make it possible to save 25% of water. This represents theoretical water savings up to 85km³/year, which is bigger than the water demand increase between 2005 and 2025 (50km³/year) (Figure 10).

The most important potential concerns irrigation with possible savings six time higher (in volume) than in the domestic sector. The water saving potential in agriculture represents more than 65% of the total water saving potential identified in the Mediterranean Region by 2025. In most arid and semi-arid countries of the Mediterranean Region, water efficiency of irrigation is below 45%.

In general, agricultural is most water consumer where 80% of water is used in agricultural worldwide. It assumed that 15% saving in agricultural will be enough to cover water supply for whole world population. Therefore, taking action in this

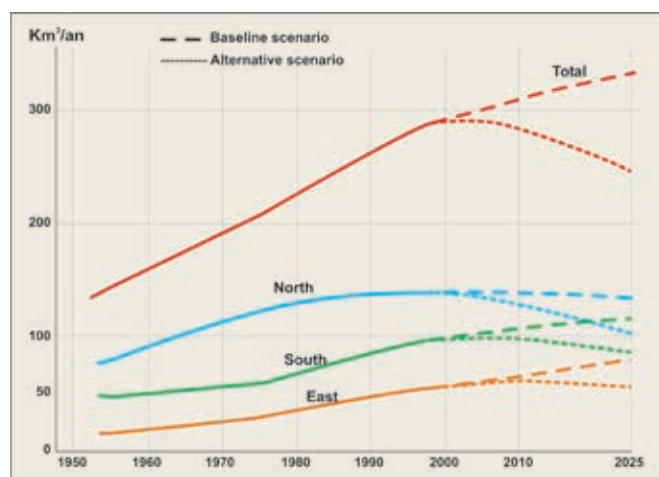
sector is of utmost importance. In addition to water savings in agriculture, improving the productivity of water in agriculture should be considered. Crop water productivity is the amount of water required per unit of yield and a vital parameter to assess the performance of irrigated and rained agriculture. Crop water productivity will vary greatly according to the specific conditions under which the crop is grown. Producing more crops, livestock, and fish and forest products per unit of agricultural water use holds a key to both food and environmental security. A variety of options exist for improving the productivity of water in agriculture through breeding, better management practices and supporting policies and institutions.

Figure 10: Water savings, demand management with the alternative scenario to 2025

Figure 10.1: Water demand per sector, baseline and alternative scenarios, entire countries



Figure 10.2: Total water demand, baseline and alternative scenarios, entire countries, 2000-2025



A report published by the European Commission in 2007 states that the water use in the European Union could be reduced by about 40% through technological improvements alone and that changes in human behaviour or production patterns could increase such savings further.

These results illustrate the global potential of water savings but do not integrate technical and economical feasibility. Significant challenges therefore remain to be addressed in terms of technological innovations and advisory services.

Concerning treated waste water reuse, the total volume in Europe was 964 Mm³ which accounts for 2.4% of the treated effluent. Spain accounts for the largest proportion (347 Mm³/year), led by Israel (280 Mm³/year around 83% of the total treated waste water).

The treated waste water reuse rate is high in Cyprus (100%) and Malta (60%), whereas in Greece, Italy and Spain treated wastewater reuse is only between 5% and 12% of their effluents. In the Middle East and North Africa, 2% of water use comes from treated wastewater.

Three quarters of the treated wastewater in Europe is applied in agriculture for irrigation. In MEDA countries, reuse of treated wastewater is predominantly for agriculture. Irrigation for landscaping and golf courses is also increasing. These figures clearly show that there is room for increasing the potential of treated wastewater reuse in a number of countries in the Mediterranean; however, the economic feasibility of this potential is not yet assessed.

As regards the institutional framework for this technology, Israel was a pioneer soon followed by Cyprus and Tunisia. In these countries, full fledged regulations supported by national guidelines set the basic conditions for water treatment and safe reuse. Desalination has for a long time been a major source of water in parts of the Mediterranean. Seawater desalination by Mediterranean countries is a steadily growing industry.

In 2002, 39 mio m³/d were produced in Algeria, Cyprus, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Morocco, Spain, Tunisia and Turkey, Spain, sharing about one-third of the total freshwater production, Libya about 25% and Italy about 18%. Desalted water is produced by very large plants (50 000 – 60 000 m³/day) and is mainly used by municipalities.

5) Virtual water in the Mediterranean

The 'virtual water' of a product is the amount of water consumed in its production process. Virtual water is an indicator that can highlight the various types of interaction between sectoral policies, especially the agricultural ones, and efficient water management. The trade of food leads to virtual flows of water from countries exporting food and manufactured goods to countries importing these commodities. In theory a water scarce country can import products that require a lot of water rather than producing them on its own territory. This is supposed to result in water savings. But due to other considerations related to climate conditions for growing special fruits and vegetables or to trade conditions, importing countries are not necessarily those which are water scarce.

Virtual water flows related to exchange of cereals are quantitatively significant in the Mediterranean Region⁸. Most of the Mediterranean countries are net importers of virtual water, except France and Serbia-Montenegro (Figure 11); however, a number of countries are virtual water exporter, thanks to the extent of irrigation.

These preliminary results illustrate that water management goes beyond the basin boundaries and that quantification of virtual flow

can assist in policy management of water resources, in particular in water scarce region. The analysis should be deepened at country level. An economic analysis, complementary to the agronomic analysis, should make it possible to address the objectives of the agricultural policies in terms of trade balance and food security, so as to then study their impacts on the management and distribution of water in the countries considered.

6) What is the economic, social and environmental added value of such policies and tools?

To date, there is no impact assessment of the implementation of water demand management measures in the Mediterranean countries. Information available from the European Commission Impact assessment accompanying the Communication on water scarcity and droughts gives a number of elements when comparing a 'water supply only' option, and an 'Integrated approach' (efficient allocation and sustainable land use planning, foster water performance technologies and practices, foster the emergence of a water saving culture) aimed at addressing the increasing impacts of water scarcity and droughts in the European Union.

Figure 11: Net balance of virtual water exchanges related to international trade in grain, soya bean, olives, specific crop products and bovine meat, average over 2000-2004 (billion m³/year)



Source: Fernandez & Thivet, Plan Bleu (2007)

The last option appears to be the most promising solution. It ensures the best-cost effectiveness ratio in the long term. It would deliver results gradually and impacts on the economy are expected to be positive from the outset and grow in the longer term, whereas social impacts would be positive with time. In addition, it would generate the greatest benefit for the environment.

In particular it is worthwhile to mention that water efficiency measures can be considered as 'no regret' solutions as it consists in optimizing water uses by losses limitation, better practices (irrigation, industry, ...), etc. Water saving measures would lead to a reduction of water abstraction and therefore would have positive impacts as regards energy saving (avoiding additional pumping for transport, treatment) and environmental preservation. In addition, reductions in water usage can be beneficial to both water utilities and wastewater utilities in terms of flow reduction.

However, economic impacts should be considered in short and longer term, in particular for Southern countries where the adaptation of irrigation practices would represent a major challenge as agriculture represents a large part of the economy.

In addition to the environmental benefits that relies on the fact that treated waste water reuse allows for the conservation and rational allocation of freshwater resources, provides an adaptation solution to climate change, and can contribute to the restoration of streams, wetlands, ponds and aquifers, treated waste water presents a number of economic benefits that are described qualitatively in the Mediterranean report: reduce overall water consumption and treatments needs; reduce the investment in new water headworks for water abstraction and treatment; lead to a reduction or elimination of fertilizer application.

As regards the social and health benefits, treated waste water contributes to poverty reduction and food security, better nutrition and sustains agricultural employment for many households.

However, the risks linked to this activity include mainly threat to public health and environmental risks. The economic impact results of public health epidemics or environmental pollution resulting from unsafe practice; high distribution and storage costs due to the distance between supply and demand. In addition social tensions can rise in case of non-acceptance of this practice.

There are only very few studies on the impacts of desalination on the marine environment. Therefore, the discharge of concentrate into the sea requires particular attention and scientific assessment of possible impacts on the marine environment

Concluding, access to water in sufficient quantity is fundamental to the daily lives of human beings and any economic activities. Imbalances between water resources and water demand already have major impacts that are expected to be made worse by climate change.

Therefore, an integrated approach for water resources management, based on water demand management is absolutely vital if the Mediterranean community is to ensure that enough water is available to all Mediterranean citizens and economic activities. Mobilization of non-conventional water resources can constitute adequate solutions when projected impacts of water savings prove insufficient, but side-effects must be carefully assessed.

Historical/Political Evolution for Water Demand Management

1) The Mediterranean Strategy for Sustainable Development (MSSD), agreed in 2005

In the framework of the Mediterranean Action Plan and the preparation of the Mediterranean Strategy for sustainable Development, a number of workshops took place addressing the issue of WDM. They indicated that increasing water supply would be an inadequate and limited policy when considering social, economical or ecological obstacles.

The Contracting Parties to the Barcelona Convention adopted in November 2005 the «Mediterranean Strategy for Sustainable Development» (MSSD). The first priority field of the Strategy is improving integrated water resources and demand management including as the first action "To stabilize water demand through

the reduction of water losses and the wasteful use of water and increase the added value per cubic meter of water used".

In 2007, the third regional workshop on WDM in the Mediterranean, held in Saragossa, in March 2007 made a number of recommendations which include inter alia the promotion of the implementation of WDM by:

- setting annually national objectives of efficiency, on the basis of regional objectives
- mobilizing, with a concern of social equity, the various instruments and tools (regulatory, normative, tariff, fiscal, contractual, market-based)
- information, responsabilization of stakeholders concerned with WDM and an assessment of progress made every 2 years.

A number of examples are provided in the Mediterranean Joint Process Water scarcity & drought report phase II. Examples from Egypt, France and Jordan illustrate the state of play in some countries.

Example From Egypt: Irrigation Improved Project (IIP), a technical measure

The Irrigation Improvement Project (IIP) started in 1984 with an area of 40,000 acres and extended to cover an additional 350,000 acres. The framework of IIP includes rehabilitation and renewal of water distribution structures, use of pipeline and raised irrigation ditches, use of one-point collective pumping from branch canal into ditches, and land leveling using modern techniques.

The improvement and modernization works to carry out by IIP vary from re-alignment of water courses and distributary canals, land leveling, re-construction of cross section, lining and use of elevated field ditches, use of buried pipeline field ditches, and control of aquatic weeds. It aims to improve water use efficiency, save water (10%), and increase crop yield. The project has proven to be successful and the ministry has established an organization within its structure to expand the project activities to cover most of the old agricultural areas in Egypt.

The main objective of the Irrigation Improvement Project (IIP) in the old lands is to improve the efficiency of water use at the field ditches and farm levels. It also initiates the user participation and involvement in the operation, maintenance, and management of the irrigation system. It also includes the redesign of the field irrigation systems and, most importantly, the formulation of Water User Associations (WUAs) that expresses the new vision for the water distribution management process.

Water Users Associations (WUA) provide ownership, transparency, and ensure the participation of farmers in managing their own affairs. Later it was realized the need to upgrade those WUA models to a higher level than the tertiary. Recently, a policy reform and pilot programs in integrated water management district and irrigation management transfer were undertaken.

The project proved to save water by increasing the efficiency in most of the commend areas by 30% to 40% and reducing the time required to irrigate by 50% for each irritation and costs of

pump operation by 25% to 40%.

Example From France: Water Demand Management instruments in various sectors

France is implementing a number of WDM actions adapted to the different water users. Water metering, distribution network indicators and water saving charters with tourism groups are the actions implementing in France in the drinking water and tourism sectors at different level (basin water agencies, local authorities, etc.).

As regards agriculture, a 'Drought decree appeared in 1992 and makes provision for temporary restrictions on abstraction in accordance with the hydro-climatic variations experienced in the course of the year. Compulsory metering campaigns as well as economic instruments and technical measures aiming at improving water efficiency in agriculture are also being utilized. Industrial taxes collected by water agencies favour reduction of industrial water consumption. In addition, recommendations for the use of best practice and new clean technologies facilitate water efficiency practices.

Example From Jordan: Water demand management in Jordan

With 140 m³/capita in 2007 Jordan falls into the category of "absolute scarcity" countries, the Kingdom of Jordan is facing an unrelenting imbalance between the total sectoral water demands and the available supply of freshwater.

In order to address some of Jordan's water problems, a National Water Strategy was developed and approved in 1997. Water demand management is currently a part of the Water Strategy for Jordan (Hashemite Kingdom of Jordan, 1997), which states that "resource management shall continually aim at achieving the highest possible efficiency in the conveyance, distribution, application and use" of water resources.

Among the 47 recommendations contained in the Strategy were the following five which pertain to water demand management:

- Priority of 100 liters per capita per day for basic human needs
- Creation of a national water data bank
- Full utilization of all wastewater for irrigation purposes
- Full but sustainable development of aquifer resources
- Adoption of a five-year resource development plan

In the demand management and conservation area, the Water Strategy cites the following four activities:

- Achievement of the "highest possible efficiency" in water conveyance, distribution and use
- Adoption of measures to "maximize the net benefit from the use of a unit flow of water"
- Definition and assignment of roles in water conservation to be played by the different sectors of society
- Promotion of water saving systems and devices

Although the Strategy does not identify any specific demand management programs, it is clear that the Ministry of Water and

Irrigation, the official body responsible for the overall management of water and wastewater, supports the implementation of demand management efforts as a necessary part of the long-term solution to Jordan's water shortages.

A number of actions were taken in the:

- municipal sector with tariffs structure promoting water conservation, water awareness increasing through media campaigns, private sector participation in management of supply systems, education (schools, plumbers, training, ...), new water laws, promotion of water saving devices, etc.
- industrial sector with treated waste water recycling, water saving devices, clean technologies, preventive maintenance, etc.
- agricultural sector with reuse of treated wastewater in irrigation, change of irrigation techniques, of agricultural production patterns, etc.

2) In 2007, a communication on WS&D on the EU side, promoting such an approach

In 2007, the European Union has addressed the issue of water scarcity and drought and considered that 'the implementation of the demand-side approach, the enhancement of water efficiency (e.g. reduction of leakages) and further educational measures must be a clear priority, even though in some circumstances it might be necessary to consider further approaches on the supply side to address the impacts of WS&D'. It also underlines that 'the River Management Plans, as established under the Water Framework Directive, should take due account of the balance between demand and supply, including seasonal and inter annual analyses, to achieve the environmental objectives and consider the need for new water supply measures once the projected impacts of water saving measures prove insufficient'. The European Council stresses 'that a comprehensive approach to addressing the issues of WS&D should include inter alia the effective implementation of integrated water resources management, the strengthening of water demand management and water saving policies,...'.

3) Recommendations of the 16th Commission of Sustainable development, 2008

The Chair's summary of CSD16 underscores the need for WDM and states that 'while demand for water is increasing in its different uses, climate change is contributing to water scarcity in many areas and regions. Implementing WDM measures will help reducing water losses in public water supply networks, increasing irrigation efficiency, and improving water productivity.'

4) Taking into account the impacts of Climate change

As presented in part 3.2, predictions covering the entire Mediterranean Region suggest up to 35% rainfall reductions by 2071-2100, reducing inland water flows and water yields. The IPCC projects, under a scenario, a 4 to 27% average decrease in precipitation for the south eastern Mediterranean with significant

spatial and seasonal variation. Further and following current trends, a tendency to a more extreme climate with more uneven distributions is projected. A 46% increase in 'significantly drier than normal' years is expected for the study area, along with an exponential increase in drought probability. Across the region, climate change is expected to reduce water availability severely, in places by up to 60% in the coming century. Water shortages are likely to worsen and in places become critical.

All these figures show that in a number of places across the Mediterranean Region, all the economic activities will have to adapt to the evolution of water availability. The expected impacts of climate change will also be exacerbated by the projected increasing economic development and growing population.

Impacts of climate change in the field of water are being taken into consideration by decisions makers:

- in the Mediterranean, where an Action Plan was agreed in November 2007 in Tunis. One of the recommendations in the dedicated chapter on 'adaptation to Climate change for better management of water recourse' concerns the development of programmes for water saving and re-use.
- in Africa, where these issues were discussed during the first African Water week (AWW-1) which was held in Tunis from 26-28 March, 2008;
- in the European Union where a White Paper is being prepared including the issue of water resources management.

Concluding, the WDM approach is not a new paradigm for the Mediterranean. Despite the fact that WDM is being analyzed and discussed for a number of years and that several countries have already implemented actions, a lot remains to be done, in particular in the context of the impacts of climate change. International recommendations provide a way forward but it is up to the local, national and regional bodies to tackle the issue as appropriate.

3.4. Water Financing

Economic analysis made around the commitments for the Millennium Development Goals 7 – MDG 7- (to halve the proportion of the population of the world without access to safe drinking water and adequate sanitation by 2015) shows the lack of financial flows for this sector. Some possible reasons are related to the lack of clear problem definition (in terms economic analysis of water management), definition of financial sustainability, lack of regulation for private sector involvement.

The way forward must focus in devolving water services to regional, rather than very local level, and prioritizing water demand management measures when seeking for funds or ensuring the adequate use of the existing ones.

Challenges related to water financing

While the quantitative, qualitative, behavioural and social issues relating to water have been frequently and exhaustively discussed

at numerous conferences in recent years, the financial issues have not had the same attention. Thus, identifying the immediate constraints to increasing the level of investments remains crucial and an essential strategic choice. The achievement of the Water and Sanitation related Millennium Development Goals and the protection of an increasingly threatened environment will require major financial investments in the Mediterranean region in terms of infrastructures, and will make absolutely necessary the implementation of sound water policies at country level. Moreover, these financial investments are also needed in terms of soft measures aimed at freshwater preservation (wetland restoration, etc), which are often the only long term approach to secure good quality water availability and continuous provision of key services (e.g. water table recharge, depollution, natural flood control, etc.).

Overall, the water and sanitation sector in the Mediterranean region raises concerns as to its financial sustainability. In addition, current water financing is inadequate to address sustainable development needs in other water use related areas, such as irrigation, hydropower or industry and tourism development. Urban and coastal development and the recent increase in agricultural demand could contribute to increase further the current pressure on water resources, raising further the existing financing and distributional concerns. To tackle these problems, it will be necessary to draw financial means from a range of sources, among which: (see Figure 12)

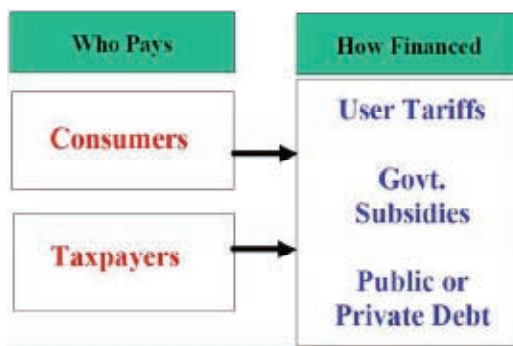
- User fees and contributions,
- Subsidies through national systems (national tax payers),
- Private sector capital investments
- Subsidies through ODA (tax payers in donor countries).

Moreover, sustainable progress in the region will require an integrated approach, linking financing mechanisms (such as water pricing issues) with water governance (integrated resource water management, involving all the water users and actors and voluntary water efficiency measures). In effect, both issues can hardly be tackled separately.

Euro-Mediterranean countries face a significant financial challenge to replace ageing water infrastructure and comply with water regulations (increase spending on water to maintain current services). They also have agreed the Millennium Development Goal of halving by 2015 the population without access to Water and sanitation to maintain current services.

The water sector has the technical expertise needed to face the challenge and is already involved in a vast program of constructing networks and water treatment plants. This work will also increasingly involve projects to maintain existing ecological systems. Considering the massive sums involved and the resulting need to raise these funds, a financial analysis of the water problem is an absolute and urgent priority.

Figure 12. The financing paradox must be resolved



If nothing changes, most of the Mediterranean countries will encounter, in less than a generation, serious problems in managing inland freshwater, the availability of which, in sufficient quantity and quality, may become, as it is already the case in several of them, a main challenge for economic and social development. Wastage and pollution will then be such that « water stress » will affect, in a way or another, most of the populations of the basin and the poorest first of all. The effects of global warming will increase current trends. The information and data regarding total investments in the water sector and for water supply and sanitation services is scarce for all countries. Several of the water sector strategies clearly state that water services must be provided in an economically sustainable manner and subsidies (operational/ capital investment) gradually abolished.

The economical performance of the water utilities is therefore becoming more and more in focus. But in most of the countries water services are still subsidized.

The tariffs and metering are critical aspects for sustainable service supply and a prerequisite for reaching the objectives of access to improved water supply and sanitation. It is also a major challenge as tariff structures and subsidies should be set at levels that do not compromise the poorest possibilities to satisfy basic need for water and sanitation services.

Even though, the poor in MED countries suffer most often from bad services or even from having no access than from tariff increases. Most of the Med countries have laws that define water as an economic good, establishing that costs connected to the service production, operation and maintenance as well as capital costs, should be covered through tariffs. The analysis indicates that there is still a long way to go before it will be possible to implement total cost coverage, mainly due to the fact that the investment needs are so large in some countries that a tariff comprising recover of capital costs, would become unacceptably high, but also because there is not sufficient financial control of the activity of the water utility companies, to actually be able to measure all costs involved. Thus, it is necessary to seek financial strategies for the water sector in the countries.

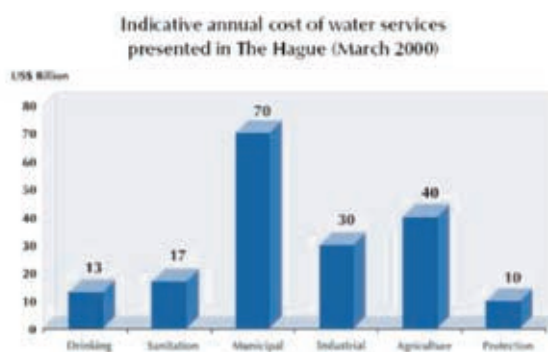
Historical / Political Evolution

The World Water Vision presented at the 2nd WWF in The Hague refers to the need for investment of \$ 4,500 billion on a world scale over the next 25 years. These figures, which take account of capacity extensions only, to the exclusion of renovation or rehabilitation work, represent an annual average need of \$ 180 billion (see Figure 13).

Following a decision of OECD Development and Environment Ministers to work jointly on ensuring access to water supply and sanitation, a Task Team of experts from OECD governments was established under the supervision of the Development Policy Committee's ENVIRONET and the Environment Policy Committee's Working Party on Global and Structural Policies. The first meeting of the OECD DAC/EPOC Water Task Team took place on 22 March 2007. The main objective of this Task Force is to support the achievement of the water related MDGs by helping developing countries to enhance the financial sustainability of the water supply and sanitation sector, and narrow focus to identify and develop approaches that support the efforts of developing countries to develop strategic financial plans for the water supply and sanitation sector.

Private entities' increasing involvement in water projects in developing countries is one way to address the huge demand for both technical and financial expertise in these regions of the world. However, the implementation of "Public-Private-Partnerships" (PPP) has faced various difficulties, which, in some cases and under certain circumstances, resulted in termination or failure of the water project. While the concept of "Partnership" seems simple, an expectations gap between the public and private partners can lead to major difficulties during its implementation.

Figure 13. Indicative annual cost of water services presented in the Hague (March 2000)



Plenty of money can be made in water services. However, the money is not made so much in long term service provision as in supplies, works, no cure no pay efficiency gains and high value added solutions and technologies. In general, the private sector is likely to seek areas where water and related activities have a high economic value (such as where industry or tourism finds itself constrained by reliable services etc.).

Other areas of interest are for instance where water services have strategic potential, i.e. opportunity to gain strategic control or leverage a greater market. For instance, the water industry often comprises significant non-essential activities that leverage the

skills and resources of the industry. In particular, there is a trend towards increased activity in processing and conversion of water related resources such as reclamation of water for drinking or irrigation from waste water, conversion of sludge/waste to energy or synergies between water and energy resources.

The private sector is also likely to play an increasing role on the operation of systems. However, few risks will be transferable and the arrangement will mainly have the character of management contracts. Private investors are unlikely to invest in long term service provision, on account of tariff, collection, demand, regulatory and political risk. Moreover, from the point of view of the public and politicians, there are certain untransferrable risks in the domain of continuity of service.

The water sector is not a sector in which the application of grants or other concessionary financing is a constraining factor to increased private financing. Conversely, the introduction of private sector involvement should not be seen a replacing the need to apply grants, subsidies or other concessionary financing for environmental, public health or social objectives. Social subsidies and grants are more likely to crowd in private capital than the opposite.

Where the public can truly support the private sector is by developing stable and sound regulatory frameworks, in particular in high value added areas such as wastewater reuse.

To meet these requirements, the financial resources committed are still low and difficult to evaluate (lack of public data, operations concerning several domains, different time scales, etc.).

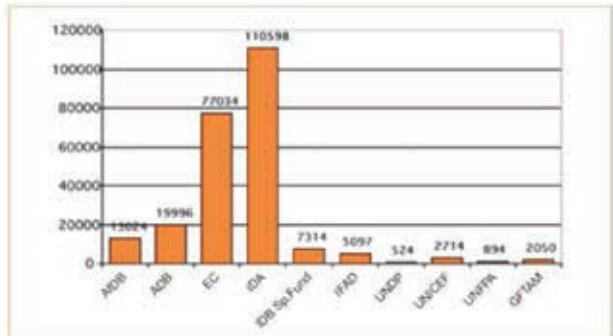
The “Assessment and prospect for cooperation in the Mediterranean water sector” provides an overview based of annual budget flows (based on the information from different organizations) over the past 5 to 13 years (see Table 2).

Table 2. Annual budget flows of some International financing sources for the water sector

Source	Amount (million €)
World Bank	270
European Commission	120
European Investment Bank	1 330
ODA	320
Total amounts	2 040

There are many funding sources in the Euro-Mediterranean region, but often with no coordination and synergy between them. OECD/DAC statistics show that between 2000 and 2004, around two-thirds of aid for water and sanitation at the international level was provided bilaterally and one third by multilateral agencies. On average, the AfDB provides less funding to the sector than some bilateral donors (Japan, United States, Germany, and France). Among the multilateral donors, IDA and the European Commission provide over three-quarters of multilateral support to the sector, with the African and Asian Development Banks providing a substantial share of the remaining quarter (see Figure 14).

Figure 14. Cumulative aid to water and sanitation from multilateral agencies 1990 to 2004 \$ millions.



Source: Development initiatives, Background Paper for the Human Development Report 2006

Hereafter, we give some examples of these funding sources for the water sector.

1) European Investment Bank (EIB)

Since the 1980s, the water and sanitation sector has been a priority area for EIB lending. Water management and sundry infrastructure –related projects help to protect and safeguard the natural environment but they do also promote regional development and economic and social cohesion not just within the EU, but also in other certain regions (partner countries).

Within the 2002-2007 period, EIB financing for capital investment in water management and sundry infrastructure-related projects amounted to EUR 26 241 million, of which EUR 692 million in the Mediterranean Partner Countries.

In 2007 individual direct loans for capital investment in water management and sundry infrastructure-related projects amounted to EUR 2,288.19 million, of which EUR 120 million were earmarked to projects in the Mediterranean Partner Countries, under the FEMIP umbrella.

FEMIP has established itself as the main financial partner of the Mediterranean region, with more than EUR 7 billion invested since its creation in 2002 (1.4 billion in 2007). FEMIP operations in the region have also help to mobilize and deliver additional finance to the South-Eastern Mediterranean countries.

Moreover, FEMIP support via knowledge and capacity building (technical assistance) to water-related projects has also helped to accelerate technology transfers to beneficiary countries, thus contributing to an investment-friendly environment which would, in turn, foster sustainable and private-sector based economic growth.

FEMIP is, thus, the financing arm of the European Neighbourhood Policy Mandate within the Mediterranean region. According to this mandate, FEMIP can deliver loans from its own resources. From 2007 to 2013, EUR 8.7 billion of own resources will be covered by the blanket guarantee of the Community budget as a last resort. Additionally, within the same reference-period, FEMIP will also implement the Mediterranean Facility II with the Bank’s own resources and at the Bank’s own risk (EUR 2 billion).

Beside those operations financed via the Bank’s own resources,

FEMIP can implement additional operations on interest rate subsidy, risk capital finance and technical assistance. These operations, although managed by the Bank, are financed via community budget resources. The current financial package for the three of them stands at some EUR 70 million.

- Interest rate subsidy aims at supporting environmental projects which are being financed from the Bank's own resources.
- Risk capital finance helps to prepare investment projects pursues equity and quasiequity investments in private local enterprises. This would help develop the local financial sector and strengthen local companies' competitiveness.
- The Technical Assistance Support Fund financing is mainly used to prepare investment projects, mainly via consulting and feasibility studies).

Finally, the FEMIP Trust Fund raises financial resources from member States and the European Commission in order to both supplement risk capital and technical Assistance Support Fund operations via private equity participations and technical assistance and upstream studies on potential projects. Up to date, the Fund has received commitments from 15 member States and the Commission which are worth almost EUR 35 million.

EIB water lending in Morocco

In Morocco, the national water company ONEP and municipal utilities ("régies") have received five EIB loans for a total of EUR 140m between 2001 and 2005. Each operation was tailored to the nature of the investments. A programme loan went to technically simple, small scale, water supply schemes. A subsidised loan supported a group of more complex water recycling and sludge disposal schemes. Other subsidised loans went to five utilities for large cities (Marrakech, Settat, Meknes, Agadir and Oujda) as the Bank's contribution to the Moroccan "Programme National d'Assainissement Liquide et d'Épuration des Eaux Usées" to put into operation basic and affordable wastewater infrastructure. The design of the projects was based on preparatory studies which were supervised and partly grant-funded by the FEMIP Technical Assistance Fund.

Another subsidised loan for EUR 20m went to the Régie Autonome de Distribution d'Eau et d'Électricité de Fès for the rehabilitation of its sewerage network and the construction of a biological sewage treatment plant to treat, for the first time, wastewater originating from 1 million residents and the area's industry. The project is reducing the pollution load discharge into the river Sebou and fostering the development potential of the Greater Fez area. Simultaneously, the Bank focused on two mid-sized cities' sanitation projects providing support to smaller utilities. The Bank's input during appraisal resulted in a more suitable design (treatment capacity, sludge treatment) of the treatment plant, thus limiting the need for higher tariff increases and rendering the project affordable. The EIB is currently promoting a large-scale programme to substantially reduce the industrial pollution affecting the City of Fez and the Sebou basin in general.

Most of these projects have been co-financed with EU-bilateral aid.

2) French Agency of Development (AFD)

Another example of funding source is the French Agency of Development (AFD), which is involved in the Mediterranean through three priority axes:

- Establishing economic links with Europe, urban development and water issues.
- Action in favour of cities deals with improving infrastructure and living conditions in urban environments, urban transportation and encouraging the modernization of financing.
- Mechanisms for local public authorities.

Water issues receive about 45% of the AFD funding. Water issues exist in many forms: drinking water, sanitation and irrigation, resource preservation and demand management. Long term management of water resources is a major stake for all these countries and already presupposes arbitration on the competitive use of water.

3) Government of Germany (Ministry for Economic Cooperation and Development, BMZ)

About 50 percent of total BMZ resources for the MENA region are allocated to the water sector. The German current sector portfolio in MENA amounts to approx. 2 (two) Billion EURO. Priority areas are:

- Improved infrastructure, particularly in urban areas
- Capacity building and Institutional development, decentralisation
- Regional academic programmes and support to regional institutions

4) The African Development Bank (AfDB)

The African Development Bank is the premier financial institution of Africa, dedicated to combating poverty and improving the lives of people of the continent and engaged in promoting the economic development and social progress of its Regional Member Countries (RMCs) in Africa. Fields of expertise and activities include among others: Water Resources Management and Water Supply or Sanitation.

By end 2006, the AfDB had committed more than US\$4 billion to water supply and sanitation, representing about 7.7% of total Bank approvals since 1967. The number of water sector operations and the associated financing over the last five years have increased in comparison to other sectors financed by the AfDB.

The African Water Facility (AWF) is an initiative of the African Ministers' Council for Water (AMCOW) to mobilize financial resources for water resource development in Africa. The AWF is hosted and managed by the AfDB. AWF funds are primarily used to fund programmes and projects concerned with water resource management with a long-term view to creating an enabling environment which will attract greater investment in Africa.

5) The Global Environment Facility (GEF)

Since 1991, the Global Environment Facility has provided \$6.8 billion in grants and generated over \$24 billion in co-financing from other sources to support over 1,900 projects that produce global environmental benefits in more than 160 developing countries and countries with economies in transition. GEF funds are contributed by donor countries. In 2006, 32 donor countries pledged \$3.13 billion to fund operations for four years. GEF projects address six complex global environmental issues: Biodiversity, Climate Change, International Waters, Land Degradation, The Ozone Layer, & Persistent Organic Pollutants (POPs).

As for water, the GEF is particularly concerned by the issue of "international waters", i.e. cross-border systems: drainage basins and water tables common to several countries and marine ecosystems that border on more than one country. A few of the themes discussed are:

- Cross-border water pollution
- Over-exploitation of underground waters
- Over-fishing
- The protection of marine habitats
- Invasive species
- Balanced use of water resources

As water problems are not held back by national borders, joint actions carried out by several countries are necessary to ensure the sustainable development of broad ecosystems covering the majority of the planet. GEF helps countries to work together with their neighbours to modify human activities that have an impact on these international water systems and on the downstream uses of these resources. This means that conflicts of water use can be avoided, safety improved and a sustainable use of the resource developed in keeping with global objectives.

The GEF acts as a catalyst by helping nations achieve full political, legal and institutional change and implement the investment necessary to deal with these cross-border water resource problems. In order to increase exchange experience between developing countries, a conference on international waters is organised every two years. This conference brings together representatives of countries which are partners in GEF projects on international waters.

6) The World Bank

The World Bank attaches high importance to environmental and sustainable development concerns. To this end, it has carried out an in-depth analysis of the water situation in the MENA region. The Bank looks at 4 major problem areas in the water sector:

- Ineffective and non viable use: Each year, seven countries in the MENA region use more water than they possess by drawing off excessive amounts of water from aquifers. Many countries waste the water they do have. In urban distribution networks, leaks often account for 40 to 50%, and more than half the water dedicated to agriculture never reaches the crops for which it is intended.
- Policy ineffectiveness: Food safety and rural employment protection policies have lead to the introduction of pricing

and non pricing mechanisms intended to protect agriculture. Under these conditions, some 85% of water resources are allocated to agriculture to grown products that the countries would often be better advised to import. Water used for agricultural activities often demands costly investment to guarantee the supply for domestic and commercial consumption. Social pricing policies prevent costs from being recovered, limit maintenance work, damage service quality and threaten the financial viability of water supply services in many countries in the region.

- Deterioration in water quality: The lack of sanitation equipment has lead to contamination of surface and underground water, which has harmful fallout for the environment and public health.
- Excessive dependency on public funds: In Egypt, the public sector invests nearly 5% of GDP in the water sector; water represents nearly one quarter of public equipment expenditure in Egypt, Morocco and Algeria. In many of these cases, however, public expenditure does not produce the returns that were hoped for. This may be because investments were poorly scheduled over time (dams built without any irrigation infrastructures planned to exploit the water held back), or over-sized in relation to the quantities of water available, which means that water needs to be rationed later. In cities, intermittent water distribution accelerates the degradation of infrastructures. In the region, only two water departments are able to cover their operating and management costs, which means that there is not enough investment in the maintenance domain. In the MENA region, the World Bank is striving to carry out or develop its activities in priority countries, under the Millennium Development Goals (notably Morocco, Egypt, Palestinian Authority) and to deepen dialog related to sector policies in the countries with which it has long-standing partnerships (such as Morocco and the Palestinian Authority).

7) European Commission (EC)

A number of EU instruments have been set up to foster the cooperation with the so-called Mediterranean Partner Countries (MPC)¹ in the water sector: The European Commission already made many efforts for knowledge development and sharing with MPC at the regional level (see Table 3). An even greater support has been and is still provided through bilateral agreements between the EU or its member states and individual partner country. These supports are usually related to large scale investment programmes, sometimes including capacity building components.

The European Neighbourhood Policy (ENP) covers the neighbouring countries to the EU both to the East (East European, and Caucasus countries) and the South (Mediterranean). Emphasis is placed on bilateral relations between the EU and the country and relations are often underpinned by the concept of agreed action between the EU and the respective country, together with a formal structure of meetings through which dialogue can take place at political or technical level. This is complemented by regional EU approaches that cover ENP countries such as the Euro-Mediterranean partnership, transformed at the Paris Summit into the Barcelona Process: Union for the Mediterranean.

On the financial side, the EU side acts mostly on the basis of the European Neighbourhood and Partnership Instrument (ENPI), which replaced the MEDA programme since 2007. It is expected to provide €12 billion (also includes the Eastern neighbours) across all sectors in the region from 2007-2013. It should be noted that the budget is split across:

- Country programmes (76% of the ENPI total). Programmed in accordance with beneficiary priorities, as defined in the National Action Plans.
- Regional programmes (10% of the ENPI total). By way of illustration the environment component of the 2007-2010 Mediterranean indicative programme is 10% of the total regional budget. This translates into €33 million spread over three years.
- ENPI component of ENRTP (Thematic Programme for Environment Natural Resources).
- At bilateral level, the following programmes can be mentioned:
 - Jordan € 10 M (water management programme)
 - Tunisia € 43 M (energy/environment)
 - Egypt: Improved Water and Waste Water Programme (IWSP); 29 Mio. € - EC. (Aimed at providing the Government of Egypt with donors' support 'EIB, AdF, KfW')
 - Interregional Programme (covering the entire ENPI area)
 - CIUDAD: Good Governance and Sustainable Development in urban areas (14 M€ decentralised cooperation programme)

The Neighbourhood Investment Facility, which will support Transport, Energy and Environment projects should also be taken into account. The yearly EC contribution to this facility amounts 50 M€ for the entire Neighbourhood region; this amount is increased by Member States contributions (including France and Germany).

Having reviewed the main financial instruments with a possible relation to water activities in the Mediterranean, the Horizon 2020 initiative is seeking to tackle the top sources of Mediterranean pollution by the year 2020, as a priority action in the regional context within the "Barcelona Process: Union for the Mediterranean". Horizon 2020 tackles the three sources responsible for 80% of the pollution - urban waste water, municipal waste and industrial emissions. In addition the initiative works on strengthening administrations, focusing research on knowledge gaps and monitoring the state of the environment. Links should be made to this initiative in the water sector as it received the high level political support of the Paris Summit. On this occasion, the French Development Agency also announced it would support Horizon 2020 with €730 million of assistance whilst Italy and France announced the launch of the €600 million InfraMed fund to support investments in Energy, Transport and Environment.

The following tables present an overview of the water sector funding agencies and their priority fields in the Mediterranean.

Table 3. Regional cooperation initiatives with a strong component on the water sector

Programme	Type of activity	Period	Water Projects with MPC	
			#	average budget
MEDA-Water	Pilot, capacity building, networking	2003-2008	9	3.7 M€
SMAP	Capacity, awareness	1998-2008	3	2.6 M€
INCO RTD-FP	Research	1994-2013	90	0.8 M€
LIFE 3 rd countries	Demonstration	1992-2006	12	0.8 M€
INTERREG	Capacity building, pilots	2002-2007	9	1.6 M€
Med Joint Process	Recommendations	2004-	6 working groups, focusing on adapting EU WFD principles	

The programmes illustrated in the table above expired in 2007-2008, while LIFE 3rd countries were extended through LIFE+ (2007-2013).

	Programme	water sector relevance	capacity building	construction & infrastructure	service & tech. Assistance	operation & management	feasibility study/ research	Education	networking & cooperation	Mediterranean
European Community funds	SMAP	*****	+							
	MEDA-WATER	*****			+	+		+	+	+
	LIFE	*****			+	+		+	+	+
	ENPI	*****			+	+				+
	INCO-MED	*****	+		+	+	+	+	+	+
	Interreg III	***	+			+	+		+	
	ENRTP	*****			+	+	+		+	+
	MEDA-NIP ₅	*****			+	+				+
	EU Governance Facility	***	+						+	+
	Euro-Mediterranean WPF	*****	+				+		+	+
World Wide funds	Global Environment Fund	***					+			
	African Water Facility	*****	+				+			
	AECI	*	+	+	+		+	+		
	The Azahar Programme	**	+	+	+		+	+		+
	IFAD	***	+				+	+		
	Government of Germany (e.g. GTZ)	***	+	+	+	+	+	+	+	+
	JICA	**		+	+	+				
	USAID	***	+	+	+	+	+	+	+	
	USGS	***	+	+	+		+	+		
	Ford Foundation	*						+	+	
	Global	*****	+	+	+	+	+	+	+	

² Source: EMWIS Technical Unit

	Programme	water sector relevance	capacity building	construction & infrastructure	service & tech. Assistance	operation & management	feasibility study/ research	Education	networking & cooperation	Mediterranean
International financial institutions	Environmental Facility									
	IUCN	*****	+			+	+	+	+	
	Wetlands International	*****	+			+	+			
	JFGE	*				+	+	+	+	
	ESA	***	+		+		+	+		
	TIGER Initiative	*****	+	+	+		+	+	+	
	UNDP	***	+	+	+		+	+		
	AfDB	**	+			+		+	+	
	EIB	***	+	+					+	
	World Bank	***	+	+			+		+	
Local European funds	The Islamic Development Bank	*	+	+						
	ADB	*****	+			+	+	+	+	
	BNWPP	*****	+			+	+	+	+	
	IADB	*			+		+	+	+	
	EBRD	***	+	+						+
	Snaabel		+							
	Ashden Award		+	+						
	FFEM	***	+			+	+	+	+	
	AfD	*				+				
	SIDA (NGO+Research)	**				+	+	+	+	
Local European funds	DFID						+			
	BTC	**	+	+		+				
	Development Aid Luxembourg			+						
	DGIS		+				+	+		+
	BMZ	***	+				+	+		



4

Overall Strategies in the Mediterranean Region to Bridge the Divides

For each priority areas identified above, the Mediterranean Water Community proposes overall strategies to enhance “Bridging Divides for Water” processes.

4.1. Water Governance

Main issues with respect to water governance in the Mediterranean

Without meaning to be exhaustive, main issues pertaining to water governance in many of the countries of the region are discussed herewith. They are addressing different but inter-linked fields of challenges, with varying levels of difficulty in achieving change.

1) Policies are developed, but they face considerable obstacles in their implementation while monitoring tools are missing

Policies have been and will continue to develop, with different pace in each country and with various levels of comprehensiveness. Social and economic dimensions in water policies e.g. alleviating poverty and reducing unemployment are often poorly reflected. Moreover, it is not rare that by the time all parts of a policy, including financing strategies, have been developed it is realized that tools are not convenient for the new challenges, or that new knowledge or better understanding of issues are introducing new realities. Sometimes, even the concepts that are developed through international processes change so fast that only a relatively small group in each country with high-level knowledge and access to forward-thinking concepts, can follow these.

Regarding implementation of IWRM policies, though efforts in most of the countries are on-going, the way is long and challenging. An important obstacle is that the required investments are too high and not affordable by many governments in the region. Obstacles encountered in implementation are discussed also under other points.

Regarding monitoring, achievements are still limited and there is consensus that water indicators should be established as part of the IWRM planning process. Each country should adapt indicators in its own realities, however establishing an international system of monitoring could contribute in better understanding problems and promoting solutions. Indicators in each country could assess (i) the extent to which key enabling conditions for the implementation of priorities have been addressed already – current stage, (ii) the progress of specific IWRM change processes and (iii) the extent to which improved water management through IWRM has successfully contributed to the achievement of the MDGs. As it relates to assessment of current stage (i) and the progress of IWRM change (ii), indicators could be structured to monitor the enabling environment, the institutional frameworks and the management instruments. As it related to MDGs (iii), indicators could primarily focus on MDG1 on Poverty and Hunger, MDG-6 on Health and MDG7 Environmental Sustainability.

2) Legislation and regulation have to be strengthened and enforced

Legislation and regulation has to advance to meet current and future challenges. Among issues that need urgent action are the introduction of environmental standards and setting of water rights. Good water status is the clear ultimate goal of water legislation in the North of the Mediterranean. Though, with the current population and development pressures, adaptation to similar standards in the South and East of the Mediterranean is a difficult endeavor, clear targets should be set and all effort should be made to be implemented for the benefit of the present and future generations. Among others, in many countries the legal and regulatory framework is still inadequate to apply economic instruments such as the “polluter pays principle”, fines associated with excess pollution loads, incentives for good practices, etc. Moreover, laws need to be updated especially with regard to standards of discharging industrial effluents to waterways.

Regarding water rights, setting of legal instruments to regulate water allocation among water using sectors and within the same sector, is lagging behind in many countries. Moreover, the establishment of a reliable legal permitting system for drilling water wells is essential, also for integrated groundwater management. Yet, often these are issued based on rules such as a pre-fixed distance between wells without any scientific approach. Introduction of water rights also support the development of water markets and set the rules for trading these rights which is often practiced unofficially among various users.

Incompliance with and inability to enforce water laws are mainly due to lack of inspection and monitoring capabilities of water institutions, lack of procedures and rules for investigating violations and assessing penalties and lack of empowerment and authority by the water and environmental inspectors to compel violations through court actions. There is a need to establish an effective law compliance and enforcement system for water issues and to provide the necessary financial and technical support required to water institutions with inspection and penalty responsibilities.

3) Overlapping and multiplicity of water institutions continue

Water institutions take several forms: agencies that manage the quantity and quality of water resources and promote inter-sectoral planning; those that provide service or regulate service providers; and those that manage the financing of water investments. Considerable progress has been made in reforming institutional settings, particularly as regards consolidating responsibilities on water planning and legislation. However, in many countries authorities responsible for the wider water sector (supply, sanitation, irrigation, energy, environment, etc) are characterized by overlapping and conflicting functions. This constitutes a major impediment to achieving appropriate balance between the water supplies from the various sources and the demands for the various users.

4) Water demand management needs even more effort

Reviews show that there is a considerable shift of policies and action in almost all countries towards Water Demand Management (WDM), including emphasis on non-conventional water resources (desalination, reuse of waste water, etc). However, these are still without the strength that is required to deal with the increasingly difficult water situation nor are supported by consistent policies. WDM remains in several countries secondary to supply management. There is scope for further programmatic work on WDM and even greater scope for action on the ground.

5) Establishing and maintaining good water governance is expensive and, at the same time, cheap

A consistent and serious water sector reform is a long and costly process. Development of national and local plans, establishment and operation of coordination mechanisms and new institutions at the national and local / watershed level, training and capacity building, stakeholders’ consultation, etc easily reach millions of Euros. However, all reviews show that benefits from such an investment pay back to the country and, when shared waters are involved, to its neighbors too.

On the side of policy implementation, the weakness of financial resources, the increase of foreign debts and low investment opportunities impede the development and management of water resources. Additionally, many governments face difficulties to allocate the necessary budget to finance the operation and maintenance programmes for the water infrastructures.

The international donor community provides assistance though bilateral and multilateral aid, but this has to be enhanced and coupled with national financing. Public resistance, lack of political will and lack of an enabling environment are often encountered when attempts are made to initiate and develop economic instruments such as metering water use, pricing of irrigation water, payment for environmental services, cost sharing on operation and maintenance of water resources infrastructures, and applying polluters pay principle on all polluters, both governmental and private sector entities. Moreover, there are no clear modalities to involve private sector to invest in water and its role remains limited, particularly compared to economic sectors (e.g. energy, telecommunication). In general there is a lack of motivation and incentive systems for private sector and investors’ participation in water.

6) Corruption remains one of the least addressed challenges in relation to water

Corruption is a symptom of governance deficiencies in both the private and public spheres. In many countries, enforcement of legislation is weak and judicial systems are inadequate. When these are combined with, for example, low wages, huge income disparities (both within and between countries) and accountability and transparency shortcomings, personal economic gain is more attractive than concern for the well-being of citizens.

Anti-corruption measures are now perceived as central to equitable and sustainable development. New research and case studies increasingly show how corrupt practices are detrimental to sustainable water use and service provision. Corruption ultimately limits the scope for improving poor people's livelihood opportunities since it cuts off scarce monetary resources and diminishes countries' prospects for providing water and sanitation for all and sound water resources management. However in certain cases, anti-corruption measures may be misused by internal political conflicts.

7) Capacity building, training and development of skills needs to meet current and prepare for coping with future challenges

Despite the increasing interest on water management over the past decade and the many and diverse activities to develop skills, the growing challenges require a much greater volume of more structured and better targeted capacity building, supported by related materials and follow-on actions. Such activities should tackle all possible issues, address all stakeholder groups and at all levels (national, local and regional).

Further attention should be given to technical capacity building of the institutions participating in the drafting and monitoring of national and local IWRM plans. Multi-discipline efforts need to be mobilized for the mainstreaming of environmental, economic, social, and legal dimensions in the developed IWRM policies, plans and laws and their monitoring. Involved personnel are commonly engineers, environmentalists and agronomists while there is a shortage of other professions (economists, sociologists, lawyers, health experts, etc). Moreover, institutions have to upgrade to become able to retain its trained staff, keeping them motivated and active.

At the local level, there is a serious shortage of capacities, knowledge, know-how and other capabilities needed to participate in and implement water policies and projects. This can be attributed to the centralized approach (i.e. top-down approach) of water policy development and the shortage of advanced training and capacity building campaigns on the new emerging IWRM issues and approaches.

8) More and reliable data and exchange of information

Lack of reliable and validated data in many countries of the region is an important constraint that impedes proper preparation, implementation and effective monitoring of policies and plans. In most cases, data collection and monitoring programmes are carried out by a variety of authorities (water, environment, health, interior, statistical service etc) without coordination and integration. There is a need to harmonize terminology, norms, methodologies and formats and to secure continuity of data collection and analysis. The latter advocates for a centralized, accredited and shared database at national level that include all data and information related to water through advanced information systems and powerful communication tools and networks.

Access to data and information sharing also needs to be advanced. Based on existing mechanisms, an international system to monitor implementation of enabling conditions, progress in IWRM and contribution to MDGs would contribute to appropriate reviewing and informed decision making. A periodic report on water resources and their management in the Mediterranean would also contribute towards these objectives.

In some countries, water data are considered of strategic importance and access is prohibited or is limited. Even in that case, the responsible authorities should elaborate ways, at least, to share info on status, trends and forecasts and provide the needed background information for promoting assessment and research work.

9) Operational linkages between research and management remain poor

Though there is a variety of scientific institutions working on water issues and research is producing important results, these are poorly linked with policy makers and management authorities. Their influence and contribution to planning development and management activities implementation remains weak. A more action oriented approach is needed by the academia and research institutes, along with enhancing of cooperation with policy makers and stakeholders.

10) Awareness and then more awareness

Awareness is the first step for sensitization, participation and action and, therefore, a foundation for good water governance. Though awareness raising activities are on-going in most of the countries, they have not been approached in an organized way and with a long-term plan. As a result, though people know about the importance of water by tradition and everyday reality, they may not practice any water saving measure and they consider that authorities will make sure of their water needs. Awareness is lower in the rural areas.

NGOs are a traditional broker of information and a key actor in raising awareness. They have to be further supported to effectively deliver that role. The media (press, radio, television, web) is an increasingly active player in water awareness. Recently, the media have placed particular attention to climate change and environment, with obvious benefits for communicating water issues linked to adaptation and needed protection measures, respectively. A more strategic and operational partnering with the media need to be made.

11) Stakeholder participation is a prerequisite

It is widely recognized that unless authorities and all stakeholders get involved in a structured and meaningful participatory processes to elaborate and monitor national policies and plans, sustainable water management will not be succeeded. Participation helps to ensure that stakeholders support the measures taken to address water problems, to find the most effective and efficient solutions by drawing on local experience and knowledge, and to solve potential conflicts between different interests before decisions are taken.

However, in many countries, existing participation mechanisms have no institutional format and are often related to projects that lack continuity and replicability, therefore, having limited contribution to stakeholders' empowerment. More support has to be provided to non-governmental organizations (NGOs), water users associations (WUAs), and other civil society organizations in order to become able to contribute in a meaningful and constructive way to the needed change. More frequent and institutionalized interaction among authorities, politicians and stakeholders would assist mutual understanding, trust and shared objectives.

Though the local level is widely recognized as the level to manage water, local authorities are still poorly involved in developments. Lack of decentralization (i.e. bottom-up approaches) and absence of communication channels and public consultation are obstacles that limit the ability of local governments to formulate or implement local and operational plans or to participate in decision making.

Public and private utilities should be further supported to deliver their objectives. Good corporate governance must be based on sufficient autonomy securing their functionality and economic operation.

Moreover, even actors from the government, that should have had an important role in policy and plan formulation, are not involved. This often includes ministries responsible for planning, development, finance, energy, health, tourism, etc.

A more prominent role of parliamentarians in the water resources management agenda has emerged over recent years, being both representatives of the citizens and legislators.

12) Education is about investing to our future

Through decades, a steadily increasing level of education of the citizens is documented in the Mediterranean countries. More educated population is better able to understand the impacts of water issues on their health and livelihoods, is better able to find effective ways to communicate their concerns to policy makers and can participate in a meaningful and constructive way in consultation processes. A system of continuous formal and informal education on water issues that focuses on the management challenges and highlights the options available as well as the need for personal action should be supported in the countries of the region.

Efforts are on-going around the Mediterranean mostly under the framework of education for sustainable development, but it is recognized that the needs for more and better targeted education on water issues are great and require central planning, a functional network of educators as well as resources and political commitment to this long-term objective.

13) More attention to gender issues

Gender refers to the roles and responsibilities of men and women and the relationship between them. These socially determined roles are influenced by historical, religious, economic, cultural and ethnic factors.

For several countries of the Mediterranean, gender mainstreaming in water resources is not well defined and is characterized with certain weakness, including lack of clear objectives on gender equality, gender analysis, resources and capacity, monitoring and reporting, tools and dialogue of gender equality. The socio-economic disparities between men and woman, the absence of women views in planning and implementation of water aspects, the non-systematic incorporation of women into water resources management, the limited involvement of women in water decision making and maintenance, the deficiencies in gender among water organizations in particular and society in general, all are problems seeking appropriate solutions.

Local capacity of women, including through their organizations, to be effective users and active contributors in planning and application of policy, should be built. At the rural areas where much of the problem exists, very few women are active in WUAs and water cooperatives. This is particularly a consequence of the restricted land ownership of women in many Mediterranean countries. Water sector activities, such as irrigation, can generate direct income for women and help them save, capitalize and own local assets. Strengthening of women representation in stakeholder processes will be a driver of improved water services and water management.

14) Water governance has to effectively tackle 'new' challenges, including shared waters management and climate change adaptation

With changing physical and socio-economic conditions that put more pressures on water resources, water governance has to effectively address arising challenges. The need for urgent action to manage 'new', through always present, issues is introducing important elements in water management. This includes adaptation to climate change, management of groundwater and management of shared water resources.

The consequences of climate change are forecasted to be particularly severe in the Mediterranean. Phenomena such as recurrent and persistent droughts, high variability in precipitation, serious decrease of soil moisture, river flow decrease, extreme weather events, desertification, etc. are expected to increase significantly in the region and will impact on freshwater availability in terms of quantity and quality. Other serious effects of warming in the Mediterranean could be sea level rise resulting inter alia in land erosion and salt water intrusion in coastal areas, thus in the loss of inhabitable and arable land as well as serious alterations of natural habitats and damages in important ecosystems. Climate change implications have to be examined in depth and to be taken seriously into account in all policies and legislation. Key players have to be engaged in action and people have to inform not only about the problem but also of the possible solutions and individual contribution.

There is an increasing consensus in the region that the benefits from shared waters should also be shared. The high degree of transboundary water resources in the region has led to several water-sharing agreements and cooperative programs. Experience has proved that cooperative actions, partnerships for management and investment, or just technical cooperation on a fair and

equitable basis can improve benefits for all countries concerned and contribute to a peaceful environment on a broader scale. Nevertheless, there are still numerous obstacles in achieving this objective that derive from the interdependence and conflict that exist among different uses, coupled with the various levels of infrastructure, legal and institutional frameworks, policies, priorities and interests of each country. Importantly, in some cases, conflict between countries has brought to a dead-end any such collaboration or coordination efforts. Improving capacities of countries on issues related to management of shared water resources (international laws and agreements, negotiation skills, conflict resolution, etc.) and harmonizing the national laws within a possible overall regional approach would be among helpful tools for sustainable water management.

The way forward: Some further considerations towards effective water governance

New realities call for integration of water management, at all levels and as part of the overall governance system. In that respect, it is recognized that water is not an isolated “sector” but a part of a wider economic system that includes agriculture, trade, energy, real estate, finance, social protection etc. Changes in that wider system may even have more impact on water management than actions within the sector and water reforms must be designed and implemented with full understanding of the changing realities of the political economy. Involving non-water decision makers, representing the sectors mentioned already, in water policy reform may increase comprehension and open new grounds for partnerships and action.

Reform planning, implementation and monitoring involve various political and technical processes and involve a broad horizon for actual and meaningful realization. Key steps of the process include understanding of the factors that drive the political dynamics of reform, analyzing where those drivers might be changing and sequencing of reform activities accordingly. For these, reforms will need political as well as technical champions that will introduce and drive the new water paradigm.

Practice has showed that gradual change would generally produce more sustainable results than attempts to completely overhaul a whole system at one go. Moreover, approaches that have achieved the most tangible results have started by focusing on specific water challenges at the national and local levels. In addition, pragmatic approaches, which take into account contextual realities, seem to have the greatest chance of working in practice. Compromises, tradeoffs, including second best solutions have been the norm rather than the exception.

Improving accountability of government agencies and water service providers to the public has to become a central objective in policy development and implementation. Transparency is essential so that the public knows why decisions are made, what outcomes they can expect, and what is actually achieved.

Complementary to national efforts, multilateral and bilateral donors as well as regional organizations assist considerably the

process. They provide funding and technical assistance as well as expertise and sharing of experiences on a variety of issues.

While countries gradually respond to the MDGs and the WSSD targets, the national water strategies and IWRM plans must describe the updated national framework of improved water governance. In order for that to be applied, the plans have to be supported by competent and capacitated institutions, legal and regulatory tools, monitoring and evaluation systems, sustainable financing strategies and adequate funding. Actions should respond to real needs and be more coordinated, coherent and output oriented. Plans have to be developed or finalized in all countries through participatory processes. Local/watershed plans have to gradually be elaborated in a similar manner.

4.2. Integrating the Climate Change Dimension into Water Resources Management

Main issues with respect to climate change and water resources management

Main issues related to climate change and water resources management in the Mediterranean, include:

1) Economic development, food security and poverty

With water resources becoming even scarcer and population growing fast in most of the region there will be even less water per capita. Serious impacts on the economic development of many Mediterranean countries whose economies and living standards are rapidly growing are also to be expected.

For some of the countries there will be even issues to the people’s livelihoods and food security since food production depends more and more on irrigated agriculture that accounts for up to 90% of water usage. Climate change poses indeed the risk of further depressing the agricultural sector’s economic performance through accelerated desertification, yield reductions and increased volatility (especially in cereals), of threatening rural jobs, increasing the fiscal burden of government intervention in support of the sector, and thwarting efforts to improve access to foreign markets for high value crops.

Agriculture yields, especially in rain-fed areas, are expected to fluctuate more widely over time, and to converge to a significantly lower longer-term average: a recent study estimates that for the region as a whole, agricultural output will decrease (in value terms) 21% by 2080, with peaks of almost 40% decrease in countries like Morocco and Algeria.

The impacts of climate change on the marine environment and fisheries are virtually unknown but the reduced freshwater input with higher nutrient concentrations might increase the

risks of eutrophication and toxic algae blooms thus increasing vulnerability of those whose livelihoods depend on fisheries.

2) Lack of awareness, integration into policy-making and sound governance

Although climate change is getting growing attention throughout the world, including the Mediterranean region, there is still little awareness of the measures to take to cope with the issue among the population but also to a certain extent among policy-makers. There is still some latent scepticism due to the uncertainty of its local and regional impacts leading to certain inertia in the political and decision-making circles. Such an attitude does not help the development of policies and even less the integration of climate considerations and coping strategies into the existing policy framework and institutional set up.

The current 'water culture', which is more focused on water supply than on water demand management, poses additional problems to the sound management of the resource in the light of occurring climatic changes. Integrated Water Resources Management (IWRM) is still in a very early stage in most of the countries in the region. So, currently, it is time to include in their basin management plan or in their hydrology national plan in case countries don't have the mentioned management tool, strategies to cope with climate change.

Furthermore, in many Mediterranean countries, governance issues, including lack of transparency and corruption are still affecting public administration, and the relevant management of water resources. This problem will be exacerbated by climate change, which will enhance existing water stress. It is therefore crucial that the governance dimension is taken into account and addressed to avoid tensions about water usage and to allow for smooth management of water resources in a context of climate crisis.

3) Knowledge development and technology transfer with regard to hydro-meteorological data and climate projections

There is general agreement within countries about the need for enhanced regional and local climate change scenarios. The greatest demand is for climate information for the next 20–50 years, and even the next 5–10 years. Uncertainties need to be reduced and more knowledge is needed to distinguish the consequences of climate change and of natural climate variability. Countries want regional and local data to be merged with hydrological models and for improvements in the accuracy of hydrological and hydraulic models, including groundwater. There is also a need to improve the coupling of climate and hydrological models. Countries see the need to maintain observation networks to identify climate change trends, and suggested including remote sensing techniques in hydrological monitoring.

In the countries of the southern Mediterranean, there is furthermore need for capacity building and technology transfer in the field of hydro-meteorological data collection and services. This would enhance disaster prevention and preparedness in case of extreme weather events such as flashfloods, storms and

even droughts. North-South cooperation in this field of research and science is therefore vital to enhance resilience. Regional cooperation would also be of benefit to MENA countries that face similar problems.

4) Energy

In addition to the already direct links between climate change, reduced precipitation and hydropower, providing additional supplies of water to alleviate droughts can often involve more investment in energy, for example desalination plants and pumped water transfer schemes. Improvements in water quality, which may be needed to combat existing pollution, also often require increased use of energy. Land management schemes for river basin protection, for example the use of land for water storage to alleviate flooding, may have implications for emissions of greenhouse gases.

Considering this climate-water-energy nexus and its implications, it is thus crucial that when dealing with adaptation, proactive, thoroughly planned strategies and structured measures are developed to ensure that coping with climate change does not imply further global warming and in turn disrupt the overall water cycle, affecting further the distribution in time and in space of water resources on our Planet.

5) Gender issues

Since women are responsible for water management at the domestic and community level in many countries of the Mediterranean basin, climate change and especially situations of water scarcity and droughts will also impact women more acutely.

Women are also lagging behind in education matters. Lack of education in turn hinders awareness raising processes in environmental issues, including climate change, thus making populations even more vulnerable to forthcoming changes.

6) Ecosystems

Already under heavy pressure from human activities, ecosystems will be even more severely affected by the climatic changes. Wetlands especially, which constitute important buffer zones for the water quality and flood prevention, are under immediate threat due to reduced water availability, further water abstraction and aggravated evaporation due to higher temperatures, while forests due to reduced humidity are more and more exposed to wild fires and vegetation cover is more and more limited, a development which worsens land degradation/ soil erosion in arid and semi-arid areas of the region and lead to the release of even more greenhouse gases.

Loss of important ecosystems and landscapes implies moreover loss of biodiversity and correlated valuable services and goods.

The way forward: Exploring water-related adaptation responses for the Mediterranean

Adaptation refers to actual adjustments or changes in decision-making management and application of measures aiming at enhancing resilience/ reducing vulnerability of people and the environment to already observed as well as to expected changes in climate. There is a wide array of potential adaptive responses/ measures to be taken separately or in combination: ranging from policies to technological, behavioural/social and managerial. Most of them are compatible or already integral part of IWRM. For this reason and since adaptation is a cross-cutting issue, IWRM could provide an appropriate framework for streamlining adaptive measures into overall water management.

It is also true that in the meanwhile most of the people of the Mediterranean region are already trying to cope with climate change, even if they are not always aware of it: e.g. the air conditioning market is booming, with heat waves becoming ever more frequent and severe; the water consumption is rising both in the agricultural and the domestic sectors as a response to reduced run-off, increased temperature, water evaporation and droughts.

However, spontaneous, individual, responsive “adaptation” measures, albeit natural to every living being/organism struggling for its survival, may result in a vicious circle: leading on the one hand to growing energy consumption, the very cause of global warming, and on the other to increased water-stress, an already “hot” issue in the Mediterranean countries.

Better - different - water management will be necessary if communities are to adapt successfully to climate induced changes in their water resources. The strategies adopted will have to use a combination of infrastructural and institutional measures and to go well beyond what is normally considered as “business as usual”. Critically, they will require major changes in the way agriculture, industry and human settlements in general are managed, thus implying Integrated Water Resources Management (IWRM). The future resilience (or vulnerability) of human communities to climate change related impacts will depend, to a large extent on the balanced combination of coherent and appropriate measures and the rapid and proper implementation of these measures.

To a certain extent resilience with regard to climate change impacts on water will depend on the state of water infrastructure. Yet, the armoury of the water manager to address variability and extreme events should not be restricted to infrastructural means. As important are the institutional mechanisms that, again in a formal or informal manner, directly and indirectly, could help to deal with climate variability and to achieve goals such as water supply for people, industries and farms, the protection of communities from flooding while sustaining ecosystems, the latter playing an important role in jugulating the impacts of climate change (i.e. as buffer zones, for groundwater recharge, etc.). IWRM and water demand management also offer a set of soft tools that are often cheaper and more effective than the infrastructural approach.

In the Mediterranean particularly, when addressing potential water

shortages, priority should be given to managing demand over increasing supply, notably by introducing new or more efficient technologies, notably by adjusting prices, as well as simply by informing, educating and promoting a culture of conservation in view of the declining water availability in the region.

In all this, it is important to recognise that many of these challenges are not new and are certainly not the product of climate change alone. Thus the changing lifestyles and dietary patterns associated with population growth and increasing affluence, arguably, have already a similar or an even greater and more immediate impact on the water environment in the Mediterranean region.

The main fields of intervention for adaptation measures relevant to water resources management to be further explored are described below.

Policy formulation, strategic planning and institutional approaches

Sound water resources management in the era of climate change will increasingly presuppose the mainstreaming of adaptation strategies and measures into water resources management at all levels, including national, river basin and regional levels, and vice-versa. These may be any activity in between the response to damages/disasters due to climate change and proactive policies aiming at reducing vulnerability.

Integration of higher “margins” in all water calculations and provisions may be sought after in the National Strategies for Sustainable Development (NSSDs), IWRM/National Water Resources Management Plans, National Adaptation Plans (NAPAs), Environmental Accounts, Poverty Reduction Strategies (PRSPs) as well as River Basin Management Plans, as applicable. Some countries of the region have already made important efforts into this direction, such as Morocco with its very successful National Human Development Initiative.

Such an integrative approach could help developing anticipatory strategies that help reduce countries’ vulnerability vis-à-vis the higher climate variability and the increased occurrence of extreme weather events.

To climate-proof the water sector, adaptation tools, such as climate scenarios, vulnerabilities assessments, priority adaptation options, climate risk management schemes could be used extensively at all levels of decision-making. Land-use planning inter alia for civil protection (i.e. relocation of communities under risk in frequently flooded coastal areas or river plains...) and in particular careful designing of water infrastructure are all extremely useful tools.

Existing water-related climate adaptation activities may be reviewed, assessed and submitted to multi-criteria analysis so as to determine the best combination of measures and prevent the “mal adaptation” potentially associated with the uncoordinated or contradictory action in different sectors or government agencies. This could also help forecast the impact of adaptation measures (generally) on water resources (i.e. groundwater quantity and quality, salinity) and evaluate necessary trade-offs as well as identify “no regret” measures/investments.

Adequate regulatory frameworks will need to be developed and

enforced; the institutional set-up might also be reformed so as to respond to emerging climate risks in a holistic approach. The adaptive capacity of individuals as well as institutions and authorities must be enhanced.

Developing Inter-institutional cooperation and dialogues between the institutional actors of the water sector and respective actors in the health, social, educational, environmental, infrastructure sectors at national level (i.e. ministries, national agencies, etc.) and regional/international level would constitute another considerable step in climate-proofing.

Technical solutions

There is a wide array of technical measures that could assist in coping with the impacts of climate change. Most of them are already linked to sound water management in a context of scarcity of the resource and growing pressure from human development.

- Water demand management

Water conservation and efficiency measures (also called demand-side measures) will be of utmost importance for the protection especially of groundwater resources from over-abstraction and should therefore be given priority. The relevant technical measures in the present case are closely linked to legal and socio-economic measures. They range notably from household water cuts, water metering and economic incentives in the domestic field to the development of water-saving devices, leakage reduction in distribution networks, drip irrigation in agriculture, and cleaner production and recycling techniques in the industry and energy sectors.

- Development of water supply and alternative water resources

In combination with water demand management, supply-side measures will be necessary to match the increasing water requirements of the people and of the various sectors of the economy. These include the development of non-conventional water resources such as rainwater harvesting, reuse of treated waste water, desalination techniques, as well as smaller, medium and water collection and storage systems, large dam structures, sustainable drainage systems, inter-basin transfers and artificial groundwater recharge.

- Climate risk management

To ensure or at least enhance civil protection in the face of climate-related disasters, such as floods, persistent droughts, storms and heat waves, climate risk management and contingency planning tools need to be developed and made available region-wide and at country or area level.

This implies notably the strengthening of hydrological monitoring capacities, the development of early warning systems, civil protection mechanisms (i.e. fire-fighting equipment), drought management plans and flood risk mitigation schemes (i.e. strategies combining watershed management and land planning). Climate-proofing of water infrastructure (i.e. dams, water collection devices) is another aspect of climate risk management.

Climate information and research

Access to climate data and especially model-generated data and their analysis, in terms of scenarios or re-analyses, is critically dependent on computational, storage and internet bandwidth facilities, which is a major challenge for many countries of the region.

Moreover, with a few exceptions, there is a lack of reliable national systems of data collection and modeling for water resources. Nevertheless suitable management of water resources can only be guaranteed if a body of reliable data is available.

Further research and development in this field for downscaling of climate predictions at the lowest possible level and for reducing uncertainties will thus be crucial for more accuracy in the water resources management and the planning of risk reduction activities. National hydro-meteorological services should be strengthened as regards skills, technical and financial means. Researches about the potential effects of climate change in water resources in natural regime, water demand (irrigation, urban supply and industry), available resource in water management systems and ecological status of water bodies should be carried out in all countries in order to cope with new scenarios.

Economic instruments

Among the first relevant activities that should be carried out, will be documenting the sector-wide impacts of climate change, providing estimates of the cost of damages and that of possible adaptation measures.

When developing adaptation strategies, all the range of economic instruments should be considered including sound pricing, positive and negative incentives, taxes, levies, charges, etc., either to enhance water demand management, to promote the use of alternative water resources or encourage diversification, in particular for sectors that are likely to be heavily impacted (i.e. irrigated agriculture).

Cross-cutting measures

There is a recognized need to **increase awareness** of and to **build consensus** among stakeholders/ water users, especially those located in risk zones, so as to enhance their adherence to water efficiency/conservation measures and pro-active adaptive attitudes. This could include informing local communities on possible actions that would protect their livelihoods and ecosystems from the effects of water-related climate change events as well as alternative options or the dissemination of best practices on water and adaptation in the region.

Capacity building activities, such as training of civil servants, officials and professionals of the water sector as well as in the hydro-meteorological services, are an additional option. **Education for Sustainable Development** – including on aspects of climate change, production and consumption patterns – at all levels will allow for developing water conservation and efficiency approaches.

Governance issues can be further addressed through bottom-up approaches such as the regular **consultation and involvement**

of stakeholders in decision-making processes, especially at local and/or river basin level where the planning of adaptation measures is most suitable. Such approaches also facilitate the acceptance by the concerned public of important trade-offs and decisions with economic implications (i.e. water pricing, etc.). **Voluntary agreements** should also be sought after with the private sector, where applicable.

There is moreover an urgent need to take into account **women's consideration and needs**, as key water users, in adaptation policies, to empower them further and to include them in all stakeholder involvement schemes related to water resources management so as to help them voice their concerns and participate in adaptation processes. This is also valid for disfavoured social groups (i.e. poor, rural communities, refugees), that will be hard hit by climate change consequences.

Addressing **transparency issues and corruption** and **reducing bureaucracy** in relation with access to water, in view of the forthcoming water stress situations is a must.

The inter linkages between impacts of climate change, **MDGs and migratory trends** and their consequences on regional and international security and integrate these into policy formulation (especially relevant to EU) need to be further explored to enhance security strategies.

Integration with other sectors

Some sectors are of particular relevance to water resources management due to their dependence from and footprint on water and vice-versa.

In the **agricultural sector**, it will be crucial to obtain "more crop per drop" not only through more efficient irrigations systems but also through switching to more drought resistant crops, in particular in arid zones, and factoring the "virtual water" principle into rural development, trade and macro-economic policies.

It will be necessary to study the inter linkages between water and **energy** with respect to climate change (i.e. water footprints in the energy sector, energy footprints in the water sector combined to climatic challenges) and integrate all these concerns into policy formulation.

With regard to **tourism and industry**, there is a need to develop water efficiency measures and expand the use of non conventional water resources (i.e. waste water reuse) in these sectors. It would also be sound to avoid the development of large-scale, water-intensive tourism activities in arid areas (i.e. golf complexes) and to promote in parallel alternative/sustainable tourism activities during seasons less prone to drought and heat waves.

In this context, the links between the development of the **Euro-Mediterranean Free Trade Zone** and additional stresses on the water resources in the light of climate change deserve to be explored.

As one of the several water users, **nature** will be severely impacted by changes in the hydrological system induced by global warming. It will therefore be crucial to take into account ecosystems needs

(i.e. minimum flows, etc.) as well as value biodiversity services that need to be maintained when devising adaptation strategies. Functional ecosystems play moreover an important role for adaptation in securing water recharge and in preventing extreme events under drastic climatic conditions.

International cooperation

Given the severity of the impacts of climate change on the region's water resources and the transboundary nature of many of the most important water bodies, international cooperation should be further enhanced to explore common solutions for shared responsibilities and benefits.

North-South cooperation in the technical and scientific fields (hydro-meteorological data collection, forecasting, development of early warning systems, etc.) are crucial, including the transfer of technologies for analysis, risk assessment, the adaptation of the infrastructures needed for managing water resources and the development of tools assisting decision-making.

At the regional level, international cooperation for the common definition of sound adaptation measures in the water sector of the region (i.e. transboundary water bodies, joint contingency plans, etc.) jointly with regional/ international actors, countries' authorities and other major stakeholders should be further explored and adaptation, development and water issues (i.e. EU Global Climate Alliance, PRSPs, NAPAs, MDGs) streamlined. Some initiatives undertaken by countries of the region, such as the successful Moroccan **National Human Development Initiative**, could serve as best practices/models and be replicated in other countries.

4.3. Water Demand Management and Non-Conventional Water Resources

Main issues with respect to water demand management and non-conventional water resources in the Mediterranean

1) An assessment of the situation of WDM in 2007

The national reports on «Monitoring progress and promotion of water demand management policies» carried out by different countries in view of the third regional workshop on WDM in the Mediterranean (Saragossa, 2007) made it possible to highlight the reality of the progress made since 2002 in matter of taking into account WDM in the water policies and certain sectoral policies.

In addition, a survey was being conducted in the framework of the MED EUWI / WFD joint process illustrating the level of implementation of WDM measures and strategies.

It has emerged that strategy documents, legislative texts or national law increasingly refer to the WDM and, this, either explicitly or, still too often, in an implicit way. Despite the fact that WDM policies are being developed by a number of Mediterranean countries, the limits of these initiatives in terms of quantified objectives have been identified.

Economic instruments are pointed out as effective instruments to move towards WDM. The usefulness of economic incentives is also pointed out. The need to further raise public awareness and communicate on the impacts of water scarcity and droughts as well as on good practices is also mentioned as a key priority. This also requires a further development of the knowledge on the issue and more efficient systems of data collection. The overview of all possible water demand measures shows that addressing water scarcity and droughts requires a set of complementary policy options including regulatory, economic, technical and educative measures. In particular, there is a need to strengthen the capacity of water managers at all levels from farmers to irrigation managers to deal with emerging problems of competition, use of low quality water, managing for multiple uses of water, water savings, and sustainability. The capacity building techniques should include the promotion of good practice, aim to develop an indigenous knowledge base in many developing countries to ensure access of water to everyone. The appropriate technology is a pre-requisite to the avoidance of costly solutions and ensures the durability of the infrastructure in meeting the local requirements.

The construction of water projects, and integrated management of the limited water resources, water conservation projects, water demand management, and capacity building in order to promote the water staff, will help in controlling the water stress. As an example, the available water technologies and models are important tools in the Hydraulics of River Engineering of Nile Basin.

The obstacles and hindrances for WDM policies are of various sorts: institutional constraints (scattering of responsibilities and lack of coordination between ministries involved in the management of water resources), lack of integration of the various policies (water and sectoral policies), absence of a legal framework, lax control, inadequate use of economic instruments, lack of public awareness of the need for water saving, lack of involvement of the users in water resources planning and management, lack of qualified staff in charge of water management, lack of financial capacity of the States, which impedes the implementation of the national plans for an integrated management of water resources and water demand (implementation remaining dependent on national budget prioritization), etc.

2) Knowledge gaps

The state of play of the implementation of WDM measures provides an analysis of the type of measures implemented. It does not give any information on the economic benefits nor on the economic or social impacts of such measures. Cost effectiveness and cost benefits analyses for the choice of WDM measures, with a long term dimension, are of utmost importance if we are to promote such an approach. Limitations of WDM approaches, both in terms of economic and social consequences, should be identified.

However the first step of such a regional analysis would be to identify the potential for concrete WDM projects on the ground. A similar approach that the one developed for identifying projects for the Horizon 2020 initiative should be undertaken. The major actions that might generate the biggest benefits in terms of water savings for the different uses should be prioritized in the different countries. Their costs, technical feasibility as well as their financial modalities should be assessed and presented to the international community.

Concerning treated waste water reuse, the Mediterranean and European experts concluded in their previous work that a commonly agreed European and Mediterranean guidance framework, water quality recommendations and applications should be developed¹⁴. This framework would provide a consistent approach to the management of health and environmental risk. Although not mandatory and having no formal legal status, the framework would provide a shared objective while allowing flexibility of approach to different circumstances at national, regional or local level.

As regards desalination, further work on risk and impact assessment should be developed including the energy aspects of such option. Guidelines for the environmental sound management of seawater desalination plants in the Mediterranean have been prepared by UNEP/MAP in 2003 and should be use as a first basis.

Concluding, the state of play indicates that a number of prerequisites are to be implemented if we are to promote WDM measures in the Mediterranean. Strengthening legislation and capacity building, developing appropriate technologies, enhancing training and delivering adequate cost-recovery policies through gradual and pragmatic approaches as well as integration of social considerations¹⁵, are a number of actions that should be promoted in the Mediterranean in order to facilitate the WDM approaches. In addition, the costs and impacts of these actions should be assessed.

A compilation of published and grey literature on WDM experiences and status in the MENA region would bring up proposals for additional WDM projects in the region. A quick review of such sources yields that WDM measures will have the highest impact in the agricultural sector and there is still much left to be done to improve irrigation efficiency.

Measures other than the use of water saving irrigation technology also need to be explored in order to decrease the high percentage of water used in irrigation, sometimes with little economic return. These include the reduction of subsidies for energy and fuel, legislation to curb water intensive crops (rice, sugar-cane and bananas), adequate cost-recovery policies where appropriate.

Given the current gap between overused renewable resources and municipal water demands especially in the countries of the Mashreq, unpopular measures need to be transformed into positive action to safeguard drinking water supplies for future generations. WDM regarding drinking water supply will have to concentrate on medium and large consumers, especially when it comes to pricing measures. Water saving devices adapted to the local market and technical conditions need to be introduced, possibly accompanied by subsidies in the first phase. Legislation to reduce illegal connections and water theft more effectively

needs to be adopted. Innovative reuse schemes in industry and households (grey water recycling) need to be adopted by MENA countries.

For all these measures, costs and benefits expected should be clearly analyzed. As regards non conventional water resources, appropriate guidelines should be developed, updated and implemented in order to consider the sustainability and avoid any health or environmental incompatibility.

Ways to explore solutions

If the Mediterranean community wants to tackle the water challenge, the development of a sustainable and secure water policy is crucial. The devising of an effective strategy towards water efficiency can make a substantial contribution to addressing Mediterranean water-related challenges.

1) Further development of IWRM plans covering WDM, and Promotion of 'no regret' solutions together with a common target in the Mediterranean

The starting point of any development of water efficiency strategies or policies as well as their implementation through WDM programmes should be a thorough mid-term IWRM planning. The two basic elements of such a planning process, setting the baseline regarding available water resources and defining and projecting water demands in all sectors need to be combined into water balances. Ideally, these projected balances would have a timeline of 5-15 years. Based on the balances, policy makers will be able to elaborate WDM implementation programmes that are targeted at exactly those sectors and regions that contribute negatively to the water balance. Also, the appropriate WDM tools can only be defined if it is known where and in which sector demand reductions are needed. Examples of such mid-term IWRM plans are available in Jordan, Yemen and Algeria.

In addition to planning efforts at national level including WDM, recommendations should concern concrete WDM short term measures, implemented in coherence with more complex measures such as development of water-related legislation, strengthening their enforcement, etc.

The first recommendation should be the promotion of water efficiency ones. Efforts to use water more efficiently should be considered as 'no regret' solutions and be promoted in a first stage and even included in other sectoral policies. In water scarce countries where the demand goes beyond the supply, stringent measures to implement water efficiency actions must be developed as a priority, and where impacts of water saving measures are proven insufficient, additional resources might be implemented, from non conventional or traditional water resources.

In order to promote a shared water efficiency culture in the Mediterranean and deliver on concrete water savings, setting water savings targets at regional level could facilitate integration of such policies at national and local level.

A quantified objective should be based on scientific works, and include existing analysis, such as the ones already available

through the Blue Plan reports, having in mind the existing IWRM plans, covering WDM that are available or being developed at national level. The economic, social and environmental feasibility of implementing this quantified target must be assessed and detailed at country level.

In addition, all the necessary technical and scientific means should be developed in order to exploit the potential of non-conventional water resources, keeping in mind their sustainability.

2) Beyond technical solutions

In addition to technical water efficiency measures, cost recovery, sustainable land use planning as well as the improvement of knowledge and data collection should also become an integral part of the policy options that have to be promoted. Mismanagement in water scarce areas should be avoided and attention must be paid in particular to the agriculture and tourism sectors. There, the economic development objectives should integrate -in a long term approach- the limitations of existing available and exploitable water resources.

A thought on WDM in the Mediterranean could constitute a starting point for a deepened analysis on development, consumption and production practices as well as cooperation policies. Water is embedded in trade, energy, tourism and agriculture and as such deserves an in depth strategy, based on protection approaches.

4.4. Water Financing

Main issues with respect to water financing in the Mediterranean

The economic systems of cost recovery are not yet widely used indeed. Awareness raising on the benefits of using them and capacity building for administrations are needed. In many countries of the South and East of the basin, cultural reservations are opposing to an industrial and commercial approach to water management. However, the investments to be made in the next decades and the operating and maintenance costs of the infrastructures are considerable and will not be, in most cases, covered by the traditional national or local public budgets.

It is not possible to use a financial approach to water without having studied its social, economic and environmental characteristics which are the three pillars of sustainable development. With access, production and distribution costs, and variations in its supply and demand, the economic character of water is increasingly evident. However, water cannot be considered solely and purely from the point of view of market logic. A balance must be found which takes account of the ability to pay for each user category, the economic cost of water, and the options for participation by public authorities in different states in a sector considered to be within their sphere of action.

Possibly the single largest reason for insufficient allocation of funds to critical public infrastructure is the lack of clear problem definition. Not stating the issues is tantamount to forsaking the opportunity to get funding to solve them.

Sustainable financing and cost recovery viewed in their entirety are a dynamic patchwork of fluid drivers and assumptions, not a simple target. Cost recovery is, from a decision-makers point of view, about optimizing the various mechanisms that contribute to cost recovery. In essence, cost recovery must aim to ensure cost-effective design and justification for funds combined with a well-functioning system to pass through these costs to tariffs or taxes. In general, in trying to promote cost recovery it useful to look at the qualitative aspects of a cost recovery system, since it is very difficult to make precise quantifications of levels of cost recovery. A nuanced view of cost recovery needs to be taken. In this regard the multiplicity of arrangements found within the EU-27 serve as a wealth of different examples of models. Essential to cost recovery is enforcement of public health, service and environmental obligations as these are the main investment drivers. Without the law and its enforcement, the water sector would cease to exist.

The discussion of sustainable financing and cost recovery needs to give due attention to the importance efficiency as well as sound planning at the appropriate level and engineering. Operational and capital cost minimization must be viewed as integral to a sustainable financial framework/cost recovery (internal revenue generation and cost-effective solutions).

The aforementioned OECD task force group discussed during their last meeting in April 2008 how the supply of finance could be increased to close the financing gap that frequently exists between the MDG costs and available financial resources. Therefore, the group focused on the role of tariffs and other sources of finance in achieving sustainable cost recovery.

Under sustainable cost recovery, not all users need pay the same price. Individual affordability of water charges should be ensured by appropriate tariff structures, including where appropriate local cross-subsidization (for example, by setting a rising block tariff structure). The part of recurrent revenues provided by taxpayers from public budgets should be secured by agreeing to the allocation of sufficient fiscal transfers a long time in advance.

The implementation for the cost-recovery through tariffs can be implemented by:

- Moving towards enhanced cost recovery requires a phased approach, where tariffs could increase gradually to subsequently cover O&M costs, depreciation of assets, new investment and, eventually and when relevant, the cost of water as a resource.
- When the initial tariff levels are extremely low (eg. 10% of full cost) a gradual approach (e.g. 10% annual increase) may result in too long time to reach the cost recovery objective.
- Metering (although it may not always be justified on economic efficiency grounds) may be a pre-requisite to convince users of the need to increase tariffs (e.g. Egypt).
- Political tariff-setting is often an obstacle to increase tariffs. There is thus a need to fix the incentive structure faced by political tariff-setters. For example, when the problem is at local level (ie. municipal authorities are the tariff-setters and are reluctant to increase tariffs) a possible solution is to issue a law that requires local taxation to make up for insufficient tariffs.

- Sometimes the problem is not the level of tariffs, but the collection rates.

In addition, the management of services has been too often neglected to the benefit of the building of infrastructures, whereas it should be remembered that, over the infrastructure lifespan, operating expenses are at least of the same order, even superior to the investment expenses. All the international institutions now agree that there is no other solution to the water problem than the direct financial participation of the users. The time lost with sanitation is extremely alarming and requires urgent reforms, several decades of constant effort and huge financial resources. It is also necessary to orientate research towards the development of new techniques, with an acceptable economic and social cost.

It should be reminded (and convince the people in charge) that the economic benefits of sanitation are indeed higher than the costs of the necessary investments and maintenance.

The renewal, maintenance, operation and management of installations are also a challenge to meet to ensure full effectiveness of the existing or planned investments. Their costs will become higher and higher and recurring.

Financial strategies at country-sector level

National strategic choices for water are made regarding allocation between agriculture, industry and domestic use. Moreover, there are significant trans-boundary aspects governing water use. Such strategic choices essentially precede the main lines of financial strategy. Moreover water use is generally within a framework of one other form of subsidy. The strategic nature of water, public health and environment also reflected in the sometimes hugely varying interpretation of needs and possibilities for investment. Ultimately, how much is invested depends on strategic choices against other sectors.

Much of the discussion regarding the public/economic nature of water derives from fears of privatization. Hence, it better to be more specific. As is seen below, the nature of water is complex and oversimplifications are likely to be counterproductive. The core issue is whether or not the normal issuance of abstraction permits can be extended to the actual sale or trade of water rights, and whether economic classification of water really has a practical use, when it is fraught with political and technical peculiarities.

Regarding water infrastructure,

- The profile of water investment projects would typically involve quite high initial capital outlays and very long payback periods, thus resulting into higher default risks when compared to other projects. Finally, water infrastructure is not restricted to one-off capital investments and sizable current spending would also be required to operate and maintain the assets. All in all, private companies would then rather prefer to invest in other sectors.
- Thus, national governments are the major source of finance for capital investments. Though, and especially in developing countries, governments usually face some important budgetary and financial constraints, which make it difficult to raise the

appropriate amount of financial resources to finance water-related infrastructures:

- Structure of public revenues is not always neither adequate nor sufficient in order to get financial resources in a quantity as to support big infrastructure-related investments.
- Social investment (even short-term) needs are quite high in developing countries and it is difficult to implement looking forward strategies which will hit the targets in the long term.
- On top of this, some developing countries do not have the capacity to borrow in local currency at short maturities, not to mention governance-related issues which might well lead to uncertainties regarding future investments' returns.

With respect to the water services:

- Pricing is an important demand-management instrument (but not the only one).

Problems: Tariff design; Collection rates

- Elements of an efficient tariff structure:

- Cost recovery
- Equity: Allow for cross-subsidies among agents and sectors. In any case, subsidies should be residual and be applied in a predictable and transparent manner;
- Economic efficiency: efficient use of water (water demand management) and incentives to new investments (this would also be a way to attract foreign private investment).
- Administrative feasibility and efficiency: Tariffs should not be too complex to be implemented
- Devolving water services to regional, rather than very local level

A financial strategy at country-sector level could deal with:

- The water sector is not facing a business-as-usual scenario; therefore there is a general need to move from historical costing and reactive one-off transfers/investments from government to an increasingly forward-looking framework, based on key decisions relating to the financiality of the water sector.
- Some differentiation between water services and water related infrastructure should be considered. There are two separate issues: the need to raise financing for new infrastructures and the need to ensure sustainable financing for operations and capital maintenance.
- There is a need for a comprehensive financial perspective for the water at country level, clarifying completely financial flows to the sector, including taxes abstraction charges, tariffs, subsidies, guarantees etc.

Different planning levels and investment objectives are lodged at distinct parts of the decision chain and obey different economies of scale in terms of skills, planning and investment. Sustainable financing covers different blends of taxes and tariffs combined with long-term loans, short-term finance and public/private equity, financing different parts of the decision chain. In the real world, there is a gliding scale between tariffs and taxes that benefit the water sector.

- At the local/regional level cross-subsidy with service areas for reasons of equity, public health and economic development

is a very important tool. Historically, the water sectors in developed countries have seen extensive cross-subsidy between urban/wealthy areas to more sparsely populated or less affluent areas. The important thing is not to jeopardize efficient use of water through inappropriate pricing.

- Extensive governmental/municipal subsidies towards investment have historically also been applied to extending services areas.
- A key financial tool is internal revenue generation, i.e. through improved billing and collection and operational efficiencies.
- One of the major challenges is to create an investment-friendly environment able, with a greater or lesser degree of governmental assistance, direct or through regulation. The attraction of high quality investors may have multiplier effects in terms a catalytic effect on new entrants. Grants might also serve as leverage investments.
- The reality is that most water infrastructure (and most other infrastructure) is financed within some sort of regulatory, subsidy, guarantee, institutional or tax raising framework that lowers the cost of capital. The essence of this observation is that governments in well-functioning countries do not consider it optimal to leave the water entirely reliant on the market for financing long term infrastructure. Government has a role to play in ensuring that the water sector has access to sufficient and suitable funds.
- If government retains significant control of tariffs, while transferring significant responsibilities for investment, it requires government to ensure either adequate financing or adequate financiality of the sector either through direct financial support or by promoting a facilitating environment through.
- Regulation and partial support. Regulatory/institutional/ financial mechanisms are put place by governments to facilitate this cost (national regulator, local tax raising powers, subsidies etc.).
- Financial intermediation has an important role to play in bring the cost of capital down for the water sector by enabling financial economies of scale and addressing certain information asymmetries in the financial and technical analysis.

Ways to explore solutions

Financial flows need to at least double. They will have to come from financial markets, from water authorities themselves through tariffs, from multilateral financial institutions, from governments, and from public development aid, preferably in the form of grants.

The full integration of economical criteria in water resource management is essential to the preservation of the resources: not only sustainable cost recovery, but also the polluter pays principle and implementation of methods of economic analysis (cost efficiency and cost benefit) which are the foundations of the EU Water Framework Directive (article 5 and 9). This requires the awareness-raising of administrations on the role and benefits of economic analysis for a sustainable and integrated water resource management as well as important efforts to build their capacity. Further research and capacity-building on the implementation of economic methods and instruments, including economic valuation of freshwater ecosystem services are also strongly

needed.

There is a widespread agreement that the flow of funds for water infrastructure has to roughly double, with the increase to come from all sources. Governments have not in practice been giving enough priority or resources to their water sector. Because the water sector tends to be decentralized, policies need to be addressed to the appropriate levels. On the other hand, a major effort of capacity building is required, with the support of donors and other parties.

Sustainable level of financing is essential, both from generating more internal funds and from creating a stable framework for future revenue transfers.

Local community organizations and local businesses, vital to the task of improving services, need resources and the powers to do this. Service oriented NGOs can be a useful support.

International loans and equity investment in water have been low and falling. Banks and private companies are now more aware than ever of the risk-reward tradeoff.

Reversing this, if the sector is restructured to absorb it efficiently Aid increases should be well targeted and used to stimulate flows from other source.

The sovereign risk on projects, including foreign exchange risk, is a key disincentive that must be addressed if water projects in emerging markets are to attract international loans and equity.

Detailed evaluation of financial requirements at least to reach the MDG related to water and sanitation in the Med countries.

In the context of adaptation of increasing water scarcity and drought concerns:

- There is a concurrent need to fully exploit the potential for water efficiency by ensuring adequate use of existing funds with priority on water demand management measures. It is appropriate to avoid counterproductive effects of water financing, like construction of inappropriate infrastructures, by carrying out full assessments of existing water availability and expected evolution in a context of climate change.

- In the longer term, it is urgent to condition the allocation of funding for additional water resources to environmental and socio economic preconditions like full utilization of water savings and efficiency, effective water pricing and metering, minimum performance of public water supply networks or recovery of the costs of projects by the water users concerned. Overall before building water infrastructures other options to fulfill the objectives to meet should be explored and the best cost effective option should be selected.

- It is also urgent to condition the allocation of funding to other sectors having an important impact on the water resource base (quantity and quality), such as tourism infrastructures (e.g. golf courses), urban development or irrigation schemes.

- In addition, it is necessary to keep progressing towards efficient water pricing policies that reflect water sensitivity, which will be indispensable to finance water demand projects usually

considered as unaffordable. This should be accompanied by the development of fiscal incentives for the promotion of water efficient devices and practices.

- It is also important to introduce industrial and commercial management in community services of municipal and irrigation water is essential, based on fair pricing between the users and allowing the covering of all the operating and investment costs of the services.

Thus, there is a need to:

- identify good practices and share experience with financing water infrastructure.

- mobilize new financial resources.

- survey current water pricing & financing practices in Euro-Mediterranean countries, identifying best practices and new challenges.

- improve the weakness and strengths of water sector finance structures in the MED region in comparison to other regions and stress the differences (i.e., tariffs are far below tariff levels in other regions).

- make financial flows within the sector more transparent (revenue and subsidy flows). The respective national Ministries of Finance should be involved more strongly in creating a balance between tariff setting, tariff-based revenues and subsidies in the sector, taking into consideration expansion needs and external effects.

- improve accounting systems and cost monitoring systems at the level of service providers.

- explore innovative sources of financing, i.e. ways to capture positive externalities of WSS for financing.

- review water policies, pricing and financing in the Euro-Mediterranean agriculture sector.

- stimulate the interest of international finance.

- develop pricing structures that would ensure the soundness of investments in the water sector.

- encourage loans at subsidized rates by local development banks.

- help developing countries to attract private funds by giving them better institutional support.

- develop multilateral funds at favourable rates for countries that accept institutional reforms and water management in the context of sustainable development.

- use the leverage created by international debt cancellations in favour of the water sector.

- adequate targeting of subsidies, which is crucial for socially just policies.

- finance water demand management, restoration of ecosystem that will ensure key services (e.g. water table recharge, de-

pollution, natural flood control, etc).

Finally, the water funding in the Euro-Mediterranean region suffers from the lack of coordination between multilateral cooperation and bilateral aids, and the absence of reliable data & management indicators on funded projects. Moreover, bilateral funds as well as multilateral ones (including EC funding) for water are mainly focusing on drinking water supply, sanitation & wastewater treatment (MDGs). Necessary measures include:

- Enhancing the mechanisms of monitoring and observation of the funded projects and programmes using OECD database or a new one,
- Inviting donors to put more emphasis on water management issues,
- Fostering coordination at regional and national levels and between both levels.

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5

Conclusions

The Mediterranean face a diversity of water challenges linked with water scarcity and droughts, climatic conditions, rapid population growth, poverty, unbalanced economic affordability and food supply, environmental pollution and ecosystem degradation and gender inequalities, which are aggravated by poor governance.

Some key figures are indicative. In 2005, the Mediterranean states and territories accounted for:

- 7% of the world's population with 458 million inhabitants,
- 3% of the world's water resources with less than 1100 km³/year,
- 31% of international tourism, with 263 million visitors,
- 60% of the population of the world's "water-poor" countries,
- 20 million Mediterranean people with no access to drinking water,
- 47 million Mediterranean people with no access to sanitation.

While a large number of efforts are made by governments, national and international agencies and various stakeholders to respond to such challenges, further and better coordinated action is needed in the framework of integrated water resources management (IWRM) in order to meet national objectives set.

The Mediterranean approaches the Forum with renewed political commitment for sustainable water management through the recently adopted Ministerial Declaration at the Euro-Mediterranean Ministerial Conference on Water, 22 December 2008, at the Dead Sea, Jordan⁵. The Ministerial Conference decided to elaborate a new Strategy for Water in the Mediterranean and to implement concrete projects in line with the demand of the populations and responding to environmental requirements. It is hoped that the Strategy will enhance cooperation and coordination, promote public participation and information access on water issues among countries and between stakeholders, enact needed reforms and promote tangible measures. This Strategy is planned to be officially approved in the next Ministerial Conference, foreseen for 2010, during the Spanish Presidency of the EU and co-presidency of the Union for the Mediterranean.

The Mediterranean Regional Document has provided an overview on key Mediterranean water challenges and critical issues to be addressed. It has also discussed strategies and suggested actions and has elaborated case studies presenting good practices in response to some of the current water challenges, aiming to bridge divides on water in the Mediterranean.

The four main topics of the Mediterranean Regional Process towards the 5th World Water Forum i.e. Water Governance; Water and Climate Change Adaptation; Water Financing; Water Demand Management, were also addressed in the last Ministerial Conference, held at the Dead Sea (Jordan) on 22nd December 2008.

In this section, focus is given to key messages from the Mediterranean. These have been elaborated through a multi-stakeholder consultation with key final meetings been held

⁵ See annex III

in Tunis (15 January 2009) and Beirut (4-7 February, during the 2nd Beirut Water Week). The Mediterranean Message, in addition of being an input to the strategic axes of the Ministerial Declaration of the 5th World Water Forum, addresses also the governments and stakeholders of the countries of the Union for the Mediterranean as a contribution for building a shared vision on the future of water in the region.

The following recommendations were produced during the Mediterranean consultation process for the 5th World Water Forum. These recommendations would also constitute strong basis for the preparation of the new Strategy on Water in the Mediterranean and the identification of concrete projects:

- To achieve sustainable management and allocation of water; peace, international security and justice, respect of human rights safeguarding of public health, eradication of the root causes of conflicts, poverty and social exclusion, should be required. Water resources problems and their solutions should be considered as a mean to enhance cooperation between countries and a key to stakeholders in approaching sustainable development.
- Improvement of water governance should include appropriate legal and regulatory tools; efficient and capacitated institutional management and enforcement bodies; balance between central and regional planning and operational management; development of Integrated Water Resources Management (IWRM) in the framework of watershed; meaningful and consensus orientated stakeholders involvement, including Parliamentarians, as well as reaching "out-of-the-box" partners and the general public, family and women as end-users. Coordination of water policies with other sectoral policies, continuity, coherence, transparency and accountability are cardinal qualities of good water governance. Water governance should be closely linked and supported by relevant projects.
- Because of the increasing coastal development, and tourism infrastructures in coastal areas, pressures on water resources are intensified. The problem should be addressed by further enhancing synergies between IWRM policies coordinated with those of Integrated Coastal Zone Management (ICZM), including the new Mediterranean ICZM Protocol.
- Climate change is being considered as an additional major pressure in the Mediterranean region, which surpasses and aggravates the severe drought consequences in the region. This topic requests further elaboration and urgent implementation of mitigation and adaptation measures applying also the prevention and precautionary principles in order to address increasing uncertainties. Adaptation should be central to all levels and functions of governance, and there is a need to concentrate on the water-energy nexus and other complex crosscutting aspects including the virtual water.
- Particular emphasis should be given to increasing water efficiency, the promotion of non-conventional water resources and appropriate reservoirs and other necessary multi-annual regulatory infrastructures in order to address the needs of human societies and ecosystems. In this line, superficial and

underground water conjunction management should be enforced, taking into account the enormous groundwater reservoirs regulatory capacity, and its special allocation preventing losses by evaporation.

- Water demand management is a valid and needed approach for the Mediterranean region. 'No regret' solutions should be based on water efficiency measures. In agriculture in particular, industry and the domestic sector, there is room for substantial improvements in water efficiency, which should be encouraged using appropriate tools. The latter should include an efficiency regional target based on sound economic and social analysis. For reallocations between the uses and ecological requirements, an integrated approach to demand management is needed in order to tackle the challenges of consumerism and explosive increase of population in some parts of the region. In the agricultural sector, the recourse to non conventional water resources in particular properly treated wastewater, should be developed.
- Mediterranean investment needs in water sector are significant. National resources as well as bilateral and multilateral funding are needed, which would also demonstrate North-South solidarity and international cooperation in the region. Financing of the sector will require the right mix of resources from all three main sources: taxes, tariffs and transfers, and a persistent major effort for sustainable financing strategies. Realistic cost recovery is an indispensable tool for financing water services, although all economical effort should take into account that water is a limited natural resource and a public good essential for life and for the majority of the economical activities. It is closely linked to human dignity. Therefore, tariffs and taxes should be differentiated reflecting local conditions and affordability considerations, particularly for the less privileged part of the society. Economic, fiscal as well as legal issues related to non-conventional water resources should be addressed in a systematic and forward looking way.
- Safeguarding the functioning of natural ecosystems is a key condition for good status of water quality and the necessary ecological services maintenance, ensuring thriving water biodiversity status as a real indicator of the ecological conditions. A regional quality should be defined.
- Water is a key component of formal, non-formal and informal Education for Sustainable Development (ESD), which should be promoted within and outside the schooling system addressing all ages and groups of end-users, as a tool for setting solid foundations for the needed new **culture of water**. In this line, Media need to play a more systematic and constructive role in water issues communication, raising public awareness on water values.
- Reliable and comparable data and monitoring networks, also employing appropriate indicators, as well as free flow of information and sharing of data, are necessary for the support of good water governance, water resources policies and international consensus on solutions for water problems, which frequently go beyond the wishes and best interests of individual countries. Walking in the same line, sharing good practices through regional initiatives and involving

authorities and stakeholders, will assure improvement towards integrated water resources management.

- Continuous research development in new water technologies, and improvements in those that we already have, should be assured as a means to achieve a sustainable development and address the climate change consequences in water resources, as well as other emerging pressures. Cleaner production by making investments in applied research, technological development, full use and rehabilitation of traditional knowledge and techniques, appropriate training, capacity building and transfer of appropriate technology should be enhanced both in administrative and private sectors.
- International agreements for management of transboundary water bodies including aquifers and groundwater should be promoted, and relevant international Conventions (**e.g. United Nations Watercourses Convention**) and other treaties should be ratified since they provide a useful framework for "hydro-diplomacy".

The Mediterranean Basin has always, and still continues to do so, based its life around water. Agriculture, tourism, industrial and urban development, health, etc. are dependent on water. The decrease in water supplies is a sad reality to the Mediterranean region's social and economic future, and has a negative impact on the quality of available resources. Hence, It is necessary to face mutual challenges and to define them locally. Regional processes as the elaboration of this document contribute to mobilising and committing worldwide action for water.

ANNE X I

Main Organizations and Institutions that offer Technical and Financial Support to Water-related Issues

The list of acronyms:

ADB: The Asian Development Bank
AFD: French Agency of Development
AfDB: The African Development Bank
AMCOW: The African Ministers' Council for Water
AWF: The African Water Facility
BMZ: Government of Germany - Ministry for Economic Cooperation & Development
CIUDAD: "Good Governance and Sustainable Development in urban areas" Programme
EC: European Commission
EIB: European Investment Bank
EMWIS: Euro-Mediterranean Information System on know-how in the Water sector
ENP: The European Neighbourhood Policy
ENPI: The European Neighbourhood Policy Instrument
EU WFD: The EU Water Framework Directive
FEMIP: Facility for Euro-Mediterranean Investment and Partnership
GDP: The gross domestic product
GEF: The Global Environment Facility
GFTAM: Global Fund Tuberculosis, Aids & Malaria
Horizon 2020: "De-polluting the Mediterranean Sea by 2020" Programme
IDA: Interchange of Data between Administrations Programme
IFAD: International Fund for Agricultural Development
IFC: The International Finance Corporation
IFIs: International Financial Institutions
INCO RTD-FP: The international scientific cooperation section of the European Commission Research Framework Programmes
INTERREG: The Cross-Border Territorial Cooperation Programme
LIFE: The Financial Instrument for the Environment
MAP: Mediterranean Action Plan

MDGs: The Millennium Development Goals
MEDA-Water: Euro-Mediterranean Regional Water Programme for Local Water Management
MENA: The Middle East and North Africa
MPC: Mediterranean Partner Countries
NGO: Non-Governmental Organisation
ODA: Official Development Assistance
OECD: Organization for Economic Co-operation and Development
ONEP: National Office of Potable Water, Morocco
POPs: Persistent Organic Pollutants
PPP: Public-Private-Partnerships
SMAP: The Short and Medium-term Priority Environmental Action Programme
UNDP: United Nations Development Programme
UNEP: United Nations Environment Programme
UNFPA: United Nations Population Fund
WSS: Water supply and Sanitation Services
WWF: World Wide Fund for Nature

1. Summary

This annex is an attempt to provide an insight into key relevant organizations that provide technical and/or financial support to water related issues.

2. Financial support

The Table 4 below gives an overview list of the main organizations, programmes and institutions that provide financial and/or technical support to water related issues in the Euro Mediterranean region.

Table 4. Water sector funds overview

	Programme	water sector relevance	capacity building	construction & infrastructure	service & tech. Assistance	operation & management	Feasibility studies/ research	Education	networking & cooperation
European Community funds	SMAP	*****	+		+	+		+	+
	MEDA-WATER	*****			+	+			
	LIFE	*****				+		+	+
	ENPI	*****			+	+			
	INCO-MED	*****	+		+	+	+	+	+
	Interreg III	***	+			+	+		+
	ENRTP	*****			+	+	+		+
	MEDA-NIPs	*****			+	+			
	EU Governance Facility	***	+						+
	Euro-Mediterranean WPF	*****	+				+		+
World Wide funds	Global Environment Fund	***					+		
	African Water Facility	*****	+		+		+		
	AECI	*	+	+	+		+	+	
	The Azahar Programme	**	+	+	+		+	+	
	IFAD	***	+				+	+	
	Government of Germany (e.g. GTZ)	***	+	+	+	+	+	+	+
	JICA	**		+	+	+			
	USAID	***	+	+	+	+	+	+	+
	USGS	***	+	+	+		+	+	
	Ford Foundation	*						+	+
	Global Environmental Facility	*****	+	+	+	+	+	+	+

	Programme	water sector relevance	capacity building	construction & infrastructure	service & tech. Assistance	operation & management	Feasibility studies/ research	Education	networking & cooperation
	IUCN	*****	+			+	+	+	+
	Wetlands International	*****	+			+	+		
	JFGE	*				+	+	+	+
	ESA	***	+		+		+	+	
	TIGER Initiative	*****	+	+	+		+	+	+
	UNDP	***	+	+	+		+	+	
International financial institutions	AfDB	**	+			+		+	+
	EIB	***	+	+					
	World Bank	***	+	+			+		+
	The Islamic Development Bank	*	+	+					
	ADB	*****	+			+	+	+	+
	BNWPP	*****	+			+	+	+	+
	IADB	*			+		+	+	+
	EBRD	***	+	+					
	Sanabel		+						
	Ashden Award		+	+					
Local European funds	FFEM	***	+			+	+	+	+
	AfD	*				+			
	SIDA (NGO + Research)	**				+	+		+
	DFID						+		
	BTC	**	+	+		+			
	Development Aid Luxembourg			+					
	DGIS		+				+		
	BMZ	***	+				+	+	+

3. Technical support

Hereafter a list of the main organizations and institutions that provide technical support to water related issues in the Euro Mediterranean region.

Organization & website	Focus	Type of support provided
EMWIS/SEMIDE – Euro-Mediterranean System on know-how in the water sector www.emwis.net	Water information and data management	Capacity building Service & tech. Assistance Management/ information services Feasibility studies Networking & cooperation
IME -Mediterranean Water Institute www.ime-eau.org	Networking of water professionals	Operation & Management Feasibility studies Networking & cooperation Technical Assistance
MENBO - Mediterranean Network of Basin Organisations www.remoc.org	Sharing experiences on basin management	Service & tech. Assistance Management/ / information services Feasibility studies networking & cooperation
Plan Bleu www.planbleu.org	Prospective on sustainable development	capacity building Research/ statistics/ prospective studies Cooperation
Med-EUWI - The Mediterranean component of the European Union Water Initiative www.euwi.net	MDGs	IWRM Planning WSS planning Technical assistance to countries Cooperation
GWP-Med - Global Water Partnership – Mediterranean www.gwpmed.org	IWRM	Capacity building Service & tech. Assistance Operation & Management/ information service Feasibility studies Networking & cooperation
WWC - World Water Council www.worldwatercouncil.org	Building international consensus	Information services/ organization of WWF Networking & cooperation
CEDARE - Center for Environment and Development for the Arab Region and Europe www.cedare.int	Support for Arab countries	Capacity building Service & tech. Assistance Operation & Management Feasibility studies/ research Training Networking & cooperation
INBO/RIOB - International Network of Basin Organizations www.riob.org	Sharing experiences on basin management	Capacity building Service & tech. Assistance Operation & Management Feasibility studies Training Networking & cooperation
PS Eau - Programme Solidarité Eau www.pseau.org	Decentralised cooperation	Capacity building Education & training Service & tech. Assistance

		Information service Feasibility studies Networking & cooperation
OSS - The Sahara and Sahel Observatory www.oss-online.org	Shared resources	Capacity building Education & training Service & tech. Assistance Information service Feasibility studies Networking & cooperation
OI Water /OIEau - The International Office for Water www.oieau.fr	Institutional management Training	Capacity building Education & training Service & tech. Assistance Information service Feasibility studies Networking & cooperation
EIC - Euro-Mediterranean Irrigators Community www.e-mic.org	Irrigation	Feasibility studies networking & cooperation
WWF Mediterranean Programme www.panda.org/about_wwf/where_we_work/europe/what_we_do/mediterranean/	Environment	Capacity building Service & tech. Assistance Operation & Management Feasibility studies/ research Education Networking & cooperation
ACWUA - Arab Countries Water Utilities Association www.acwua.org	Service management	Capacity building Service & tech. Assistance Feasibility studies/ research Networking & cooperation
BALWOIS - Water Observation and Information System for Balkan Countries www.balwois.net	Sharing experiences on water management	Capacity building Research Information services Networking & cooperation
INWEB - International Network of Water-Environment Centres for the Balkans www.inweb.gr	Transboundary water management	Capacity building Service & tech. Assistance Operation & Management Feasibility studies Education & Training Networking & cooperation
MedWet - Mediterranean Wetlands Initiative www.medwet.org	Wetlands	Capacity building Service & tech. Assistance Operation & Management Feasibility studies Networking & cooperation
CIHEAM - International Centre for Advanced Agronomic Studies www.ciheam.org	Research on agronomic studies	Capacity building Education & training Research Service & tech. Assistance Information service Feasibility studies Networking & cooperation
IRD – The Institute for Research & Development www.ird.fr	Research	Capacity building Education & training Research Service & tech. Assistance Information service Feasibility studies Networking & cooperation

UNEP/MAP - United Nations Environment Programme / Mediterranean Action Plan www.unepmap.org	Mediterranean Sea	Capacity building Service & tech. Assistance Information service/ statistics Feasibility studies Networking & cooperation
EEA - European Environment Agency www.eea.europa.eu	Environmental assessment	Capacity building Service & tech. Assistance Information service/ statistics Networking & cooperation
UNESCO - United Nations Educational, Scientific and Cultural Organization www.unesco.org	Education programs	Capacity building Education & training Information service Cooperation
UN-ESCWA - United Nations Economic and Social Commission for Western Asia www.escwa.un.org	Social, Economic & Sustainable Development Information and Communication Technology/ Statistics Programmes Planning & Technical Cooperation	Capacity building Education & training Service & tech. Assistance Information service/ statistics Feasibility studies Networking & cooperation

ANNE X II

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ANNE X II I

Declaration of the Euro-Mediterranean Ministerial Conference on Water

Adopted, together with its annexes, by Ministers and Heads of Delegations participating in the Euro-Mediterranean Conference on Water held in Jordan on 22 December 2008,

We, the Participants,

Recalling,

- i. The Algiers Declaration (1990) and the Mediterranean Water Charter (Rome, 1992), underlining that water can positively contribute to cooperation among countries;
- ii. The Euro-Mediterranean Summit of Barcelona (27-28 November 1995) recognizing that water supply together with suitable management and development of resources are priority issues for all Mediterranean partners and that cooperation should be developed in these areas, as appropriate;
- iii. The Declaration of the Euro-Mediterranean Ministerial in Turin, 1999, that reached an agreement on an Action Plan on Local Water Management and entrusted the Euro-Mediterranean Water Directors with the task of orienting, following up and assessing the implementation of the Action Plan;

Noting,

- i. The United Nations Conference on Environment and Development (Rio, 1992), the Millennium Development Goals (2000) indicating specific targets in the field of water by 2015, the World Summit on Sustainable Development (Johannesburg, 2002) and actions taken under the Mediterranean Component of the EU Water Initiative (2003);
- ii. the Strategy for Sustainable Development in the Mediterranean and in particular its priority on «Improving integrated water resource and water demand management» adopted by the Parties to the Barcelona Convention in Slovenia (Portoroz, 2005) and supported by Euro-Mediterranean Partners during the 10th anniversary of the Barcelona Process;
- iii. the United Nations Framework Convention on Climate Change and the Intergovernmental Panel on Climate Change fourth

assessment report, adopted in November 2007, as well as the United Nations Convention on Combating Desertification and its "10-year strategic plan and framework to enhance the implementation of the Convention (2008-2018); the United Nations Convention on the Non-Navigational Uses of International Watercourses (1997);

- iv. The decision taken during the 15th Conference of State Parties to the Barcelona Convention in Almeria, 2008, to "strengthen cooperation and seek synergies with initiatives pursuing similar environmental objectives";

Highlighting,

The conclusions of the Paris Summit for the Mediterranean (13 July 2008), and in particular its reference mentioning that the Euro-Med Ministerial conference in Jordan in 2008 will define a Mediterranean water strategy, promoting conservation of water resources, diversifying water provision resources and efficient and sustainable use of water and the decision of launching the initiative of de pollution of the Mediterranean built upon the Horizon 2020 programme, as adopted by the Euro-Mediterranean Ministers of Environment in Cairo (2006).

Welcome favourably the representatives of civil society

Underline the importance of the results of effective cooperation in the field of water between Euro-Mediterranean partners in order to efficiently meet the challenges facing the countries of the region and to empower them with the tools to address these challenges and encourage further strengthening of this effective cooperation in particular in the fields of Integrated Water Resource Management, water supply, sanitation and transboundary freshwater resources, within the context of sustainable development, thus promoting equitable access and adequate supplies of water;

Recognize the enhanced cooperation between the EU and its Mediterranean partners, through the Barcelona Process: Union for the Mediterranean, the Instrument for Pre-Accession and the European Neighbourhood Policy, and commit themselves to work together to implement the bilateral agreements, the Action Plans agreed in the ENP framework and other forms of co-operation, in order to promote sustainable development in the region;

Stress:

- i. the degradation of resources both from a quality and quantity point of view;

- ii. the necessity to design and implement strategies and plans to achieve sustainable water resources management through integrated approaches comprising all kinds of water and all its uses ;
- iii. the growing gaps between water consumption and availability of resources, in particular in the light of the priority given to supply side policies;
- iv. that the widening of such gaps, without a coordinated action, is likely to be worsened by the effects of climate change, economic development and demographic growth;
- v. that water supply measures (traditional or alternatives) might be considered once the projected impact of water savings prove insufficient;
- vi. the imbalances in access to water supply and sanitation, bearing in mind that equal access contributes to poverty eradication, the improvement of health, economic development, hygiene, sustainable land use development, education, protection of the environment and of ecosystems;
- vii. the need to prepare a comprehensive and detailed assessment of water resources in the Mediterranean and of management policies and based on homogeneous and coherent information;
- viii. the necessity to promote the development of science-based technologies that will provide inter alia for efficiency in water use and supply measures;

1. A Strategy for Water in the Mediterranean Focused on the Needs of Populations and Future Challenges

1. Taking note of the different challenges evoked, the Ministers agree to define the Long Term Strategy for Water in the Mediterranean, as decided by the Heads of State and Government. This coordinated and integrated Strategy, will:

- i. tackle problems that go beyond the means of any one country, organisation or initiative, in particular those related to the impact of climate change and environmental needs, that call for a co-ordinated approach and increased cooperation;
- ii. build on integrated approaches, taking into consideration every kind of water, the needs of different users, by means of integrated management at basin level, as a tool to allow countries in the Mediterranean to respond to these challenges collectively and individually;
- iii. include two main goals: conservation of water quality including the prevention of further deterioration of water resources and the balance between the quantity of water used and the quantity of water available including mitigating and preventing the consequences of droughts and water scarcity;
- iv. include both measurable qualitative and quantitative objectives, as part of a voluntary commitment to achieve these goals;
- v. consider the most appropriate instruments to reach the objectives of the Strategy, with a view to achieve economic growth, social prosperity, equitable access and adequate supplies of water, and environmental protection, notably through improved efficiency of all water uses, appropriate

- governance arrangements, legislation and institutional arrangements, effective national and local planning, innovative financial mechanisms, tariff policies, standards, labels, alternative solutions, keeping in mind the differences in national situations and the need to increase the citizen's awareness by promoting the wide participation of civil society aiming at building the culture of water;
- vi. develop and exploit for the benefit of all, scientific, technical and technological tools in these fields.

2. Based on these principles, Ministers approve the guidelines for the Strategy for water in the Mediterranean as defined in Annex 1 to this Declaration together with its elaboration calendar;

2. An Efficient and Shared Elaboration and Follow Up Mechanism

3. Ministers decide to work more closely together in order to define, in a shared and balanced framework, the Strategy;

4. Ministers underline the need to work closely both at a regional and national level with other Ministers concerned by water issues;

5. Ministers task a Water Expert Group, composed of government designated representatives of national authorities in charge of water policy of Euro-Mediterranean countries having the capacity to take decisions (e.g. water directors) and the European Commission to elaborate further the Strategy for Water in the Mediterranean as well as to assist its implementation and follow-up, in line with the guidelines described in Annex 1;

6. Ministers agree to work to ensure the provision of appropriate financial resources and technical support to elaborate and implement the Strategy;

7. Ministers invite funding institutions to coordinate at regional and national level, in order to support the elaboration and the implementation of the Strategy;

8. Ministers call on all stakeholders, including parliaments and the EMPA, to contribute, where appropriate in a coordinated manner, to the development of the new Strategy as well as to support appropriate means for its implementation;

9. Ministers encourage further strengthening of effective cooperation in particular in the fields of Integrated Water Resources Management and Water Supply and Sanitation and reaffirm the importance of elaborating and implementing, through participatory processes, effective national and local IWRM based on realistic financing strategies;

10. Ministers reaffirm the importance of data, information and statistics on water, based on internationally agreed definitions and methods, structured within information systems, for analysis and decision making and insist on the need to dispose of national and regional systems that contribute to the definition, implementation and follow-up of the Strategy;

11. Ministers hence call for strengthening the coordination of existing Euro-Mediterranean initiatives and networks on information and expertise, policy planning and monitoring as

well as capacity building so as to increase synergies between ongoing activities; in particular, exchange of information will be implemented through voluntary approaches, keeping in mind the objective of seeking comparability, consistency and avoiding duplication of work ;

12. Ministers underline the importance of exchange of good practices, including through EU, Mediterranean, and other relevant programmes.

3. Launching of the Elaboration of the Strategy for Water in the Mediterranean

13. Ministers consider the technical work prepared by the Euro-Mediterranean Water Directors as a contribution to the success of the Conference;

14. Ministers welcome the contribution of civil society in the field of best practices as well as the projects and partnerships developed in line with its principles and presented in the margins of the Conference;

15. Ministers encourage a swift implementation of partnerships in order to implement concrete projects in line with the guidelines of the future Strategy and with a strong sense of co-ownership by the concerned populations and underscore the importance of the active participation of civil society, local and regional authorities and the private sector in the implementation of these partnerships;

16. Ministers suggest to adopt the Strategy for water in the Mediterranean by the next Barcelona Process: Union for the Mediterranean summit scheduled in 2010; this Strategy will be subsequently developed in a related Action Plan and will be regularly reviewed;

17. Ministers propose to hold the 4th Euro-Med Ministerial Conference on water in the first half of 2010;

18. Ministers invite the Mediterranean Commission for Sustainable Development to consider such Strategy as a possible contribution to the « Improving integrated water resource and water demand management » priority of the Mediterranean Strategy for Sustainable Development;

19. Ministers invite the Foreign Affairs Ministers to take note of these conclusions and look forward to their presentation to the next Environment ministerial conference and, because of the issues at stake, to the Agriculture Ministerial Conference.

20. Ministers thank the Jordanian Government for hosting the 3rd Euro-Mediterranean Conference on Water co-chaired with the French EU Presidency and Arab Republic of Egypt as co-chairs of the Barcelona Process: Union for the Mediterranean.

ANNEX 1

Guidelines for the development of the Strategy for Water in the Mediterranean

1) The strategy aims at tackling the main challenges in the field of water in the Mediterranean region, notably by fostering effective cooperation between Euro-Mediterranean partners within the context of sustainable development;

2) It will be based on:

a. the lessons learnt from the implementation of the Turin Action Plan, the Mediterranean Component of the EU Water Initiative for the achievement of the MDG and WSSD targets, and from the “integrated water management and water demand” priority of the Mediterranean Strategy for Sustainable Development bearing in mind that the Mediterranean Commission for sustainable development shall be consulted;

a. The work and experience of regional, national and local institutions dealing and supporting efficient water uses and aiming at improved quality of water for human consumption, to serve economic development, social equity and prosperity and environmental protection, to promote better management of water demand and an efficient allocation of water resources in the different activities;

a. The lessons learnt from best practices on water resources management;

3) The Strategy will address in particular the challenges of growing water demand and impact of climate change, keeping in mind the need for equity considerations and preparing a list identifying the countries most affected by climate change in the Euro-Mediterranean region; it shall aim at reintegrating or maintaining the balance between supply and demand, consumption and availability, firstly as regards agricultural uses (as agriculture is the main water consumer in the region), and taking into account the ecosystems’ needs;

4) The strategy should take into account governance reforms;

5) The Strategy will be translated into policies, initiatives and actions that should give high priority to improved demand management encouraging water efficiency and the mobilisation of water supply measures (traditional or alternatives including wastewater reuse, desalination, rainwater harvesting), once the projected impacts of water saving measures prove insufficient, and encouraging benefit sharing through transboundary water management.

6) The Strategy will cover the following areas:

a. Advancing on effective water governance for integrated water resources management and water supply and sanitation ; awareness, technical and capacity building and coordination within administrative units and among stakeholders;

a. Addressing water and climate change, through adaptation measures together with mitigation with emphasis, inter alia, on management of droughts and floods, mitigation of water

scarcity effects and combat desertification;

- a. Optimizing water financing, water valuation and appropriate instruments, with emphasis on innovative mechanisms

- a. Water demand management and efficiency and non-conventional water resources.

7) The strategy will include both qualitative and quantitative objectives, as part of a voluntary approach, in particular a quantified objective for water savings at regional level;

8) The strategy will include an Action Plan, specifying the modalities through which these objectives will be achieved for the related years;

9) The strategy will draw upon existing initiatives and partnerships, in accordance with its principles;

10) The strategy will aim at developing a coherent system and efficient synergies between the existing initiatives in order to assess priorities both at a regional and national level ; enhanced coordination of financial resources at a national, regional, and international level shall be sought;

11) The elaboration, implementation and follow up of the Strategy will be assisted by the strengthened collaboration between existing organisations, institutions and initiatives on water related MDGs and IWRM targets;

12) To ensure definition and implementation of the Strategy, water related information will be structured at a regional level, based on existing thematic contributions;

13) Strengthening the coordination and synergies between the existing Mediterranean initiatives and networks on information and expertise should contribute further to the elaboration, implementation and follow-up of the Strategy by:

- a. facilitating the development of national information systems, national documentation centres and related training activities;
- b. developing, at regional and national level, within the context of existing initiatives and governance mechanisms, exchange systems inter alia on : (i) water related information and monitoring, (ii) documentary data, (iii) professional training (iv) prospective analysis, (v) research, know-how and technology;

14) Ministers agree to entrust the Euro-Med Water Expert Group with the following tasks and according to the below modalities:

- a. Under the political guidance of the Euro-Mediterranean Ministers responsible for Water, the Water Expert Group will:
 - i. carry out the tasks defined by the Ministerial Declaration on Water agreed in Jordan on 22 December 2008 including through the provision of technical inputs for ministerial meetings;
 - ii. endeavour to provide technical input to water related initiatives and processes in the region including recommendations to enhance effectiveness, coordination and complementarity of all key water related activities.

- iii. develop a draft annual work-plan along the lines of the calendar and tasks defined by the Ministerial Declaration on Water agreed in Jordan on 22 December 2008;

b) The Water Expert Group is co-chaired, when possible, according to the co-presidency rules of the Barcelona Process: Union for the Mediterranean.

c) Representatives from local authorities, civil society including the private sector and other stakeholders dealing with water management, as well as international and regional organizations, funding institutions, donors and other bodies may be invited to the meetings of the Water Expert Group as observers.

d) The Water Expert Group works on the basis of co-operation and open exchange of views. Decisions should be taken only on the basis of consensus.

e) The Water Expert Group meets at least once a year.

f) The working languages of the Water Expert Group will be coherent with the Barcelona Process: Union for the Mediterranean.

g) Each participant of the Water Expert Group on Water Issue is expected to support his involvement in the Group's work with his own resources. If funding becomes available, participation in the Group's work (e.g. attendance at meetings, etc) may be supported.

h) Where appropriate, a Secretariat facilitating the tasks of the Water Expert Group will be set up and will act in coherence with the Barcelona Process: Union for the Mediterranean

15) The calendar for the elaboration of the strategy must be coherent with the calendars of related initiatives and programmes: The calendar is the following

- a. Water Expert Group's contribution produced during its annual meetings, including two meetings before the end of 2009;
- a. Adoption of the Strategy: Ministerial Conference on Water of 2010 in order to be submitted to the Barcelona Process: Union for the Mediterranean summit.
- a. Developing strengthened coordination of the existing Mediterranean networks of information and expertise on water, including first discussions in early 2009 covering inter alia water information, policy planning and monitoring, capacity development and sharing of expertise and the development of partnerships as from 2009.

ANNEX 2

WATER PROJECTS

In the framework of the ministerial declaration adopted during the Conference on Water held in Jordan on 22 December 2008, the Ministers and Heads of Delegations wish to incorporate the continuation of their work into the ethos of the Paris Summit by the swift implementation of concrete and visible projects on the ground, helping to resolve the severe problems caused

by the degradation of water quality and quantity and by the growing gap between resource availability and the increased needs and demands of the farming, domestic, industrial, tourist and environmental sectors.

They take note with satisfaction that the implementation of the Process has already enabled a number of water projects to be identified, with these projects in line with the Paris Declaration for the Mediterranean and relating to the following priority concerns:

1. Adaptation to climate change.
2. Balance between supply and demand.
3. Conservation and rehabilitation of natural environments.
4. Depollution of the Mediterranean.
5. Technologies and efficient use of water

Taking note of a first, indicative list of projects identified as examples and proposed by France, Jordan, Greece, Spain, The Netherlands, Egypt and Turkey, they ask all the partners to put forward the projects that they want to carry out so that they can be considered by the process.

They wish future projects to be in line with the guiding principles of the Future Strategy for Water in the Mediterranean and its accompanying action plan and consistent with ongoing processes, policies and programmes to learn lessons from replicable completed projects and emphasize the importance of multi-country projects. In addition, these projects could contribute to specific activities such as training, technology transfer, awareness and capacity building.

They call for mobilizing urgently additional funding for the implementation of the projects, in conformity with the Paris Declaration.

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