



Handbook
on
Freshwater
in the
Mediterranean

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The Global Water Partnership-Mediterranean (GWP-Med) is a Regional Water Partnership of the Global Water Partnership (GWP). GWP-Med, in its present form, was created in 2002 and it is the successor partnership to the Mediterranean Technical Advisory Committee of GWP (MEDTAC).

GWP-Med is a platform bringing together competent organisations working regularly on water issues in the Mediterranean region. GWP-Med's goal is to promote and exchange knowledge on IWRM for the sustainable use of the region's water resources.

To achieve its goal, GWP-Med:

- Promotes and sustains a strong partnership in the Mediterranean among competent organisations that have an impact on water management.*
- Makes the principles of sustainable use and integrated management of water resources (IWRM) widely known, recognised and applied by countries and all other stakeholders in the Mediterranean, through appropriate mechanisms for sharing information and experience.*
- Supports exemplary actions at local, national and regional level that demonstrate the value applicability and positive impact of the above principles.*
- Seeks and facilitates the appropriate international funding and involvement of international institutions for activities promoting IWRM.*
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- Assistance for the establishment, strengthening, co-operation and co-ordination of Mediterranean NGOs and facilitation of their efforts by ensuring the flow of appropriate information among relevant bodies.*
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Introduction

Water is one of the most vital prerequisites of life on our planet and its scarcity and vulnerability to pollution and contamination are well-known since antiquity. However, its importance on the political agenda was, and in some countries still is, very low due to a number of historical and socioeconomic reasons.

In the Mediterranean, water is a particularly valuable natural resource indispensable for any kind of urban and rural development, for agricultural production, for advancement in the tourism and industry sectors.

Although in the international literature one could find a large number of publications on freshwater there are relatively few that refer to the Mediterranean region and most of them cover statistical data only for particular periods or specific countries. Only some of these include suggestions for strategies and activities.

Very little has been published in a brief, accurate and comparative way about water in the main economic sectors and virtually nothing about existing or emerging legal and institutional international/regional frameworks useful for water policies. Even less has been published on new schemes of partnerships and collaborations aiming at the promotion of Integrated Water Resources Management and Effective Water Governance, inclusive of tools and examples from the field.

The present handbook attempts to fill this gap.

The handbook has three main chapters.

Chapter I analyses, on the basis of the most recent information, the causes and consequences of the **water crisis in the Mediterranean** trying to highlight similarities and differences in the status of water resources, in the modes of exploitation and in the existing management systems across the four Mediterranean sub-regions - the **North Mediterranean**, including Portugal, Spain, France, Monaco, Italy, Slovenia, Croatia, Bosnia-Herzegovina, Yugoslavia Albania, Greece and Turkey, the **North of Africa**, Morocco, Algeria, Tunisia, Libya and Egypt, the **Middle East**, with Syria, Lebanon, Jordan, Israel and the Palestinian Authority and the **Mediterranean Islands**, Cyprus, Malta and the islands of Croatia, Greece, Italy, France, Spain and Tunisia - relating them to demographic, economic, physical, institutional and political factors.

Chapter II discusses the possible strategies proposed in different fora to **meet the challenge**, i.e. to actively react to the water crisis. The multi-sided and concerted interventions needed at the institutional, economic and socio-cultural levels to promote a more sustainable use of water resources based on re-allocation among productive sectors and demand management priorities are briefly examined in this section.



Finally, chapter III presents the existing and evolving framework directed towards enhancing **Effective Water Governance and an integrated management of water resources** in the Mediterranean region, including the on-going Mediterranean Dialogue on Effective Water Governance (MDEWG) and the tools and instruments in place (such as the GWP ToolBox for IWRM, the active Mediterranean partnerships and existing water legislation) that support a shift towards a more sustainable water resources management.

Several sections of the handbook include presentations of case studies as well as numerical data, recent estimates, statistics and trends -either in the text or in tables.

Moreover, all relevant terms and expressions related to water issues (highlighted in bold and italics) have been compiled into a glossary that provides their definitions as well as the translation of each term in ten Mediterranean languages. The handbook is supplemented with a bibliography and further reading, an extensive list of relevant sources on the web and a list of acronyms useful to all those working on water and the environment in general.

The handbook, though brief, offers all that is necessary for one to learn about freshwater and its management in the Mediterranean. It addresses a wide audience: non-experts such as journalists, interested politicians, university students following water courses or courses on environmental management, NGO staff dealing with water but also water practitioners and experts who wish to acquire updated information about Mediterranean realities and specificities.



CHAPTER I: WATER CRISIS IN THE MEDITERRANEAN

1.1 SCARCITY OF WATER RESOURCES

Water scarce countries are customarily defined as those with less than 1000 cubic meters of freshwater available per person per year - not enough to provide adequate food or support economic development and a potential cause of severe environmental problems. Countries with 1000 to 1700 cubic meters per person per year are said to be '*water stressed*'.

Water scarcity has historically been a dominant feature of the Mediterranean. Throughout its history, water has been the essential element for economic and social development and a defining factor for stability in the region. Being a basic element in food production, economic development and life itself, water has been a pivot and a symbol within the region's cultures. It is an essential element, which is impossible to replace, expensive to transport and store, and difficult to purify. Water in most countries and regions of the Mediterranean is a limiting or at least critical factor for both *biodiversity* and traditional norms of development. For this reason cultures and civilisations have been striving to adapt their lives and agricultural practices to situations of scarcity and increase their catchments and storage capacities so as to prevent the worst consequences of irregular water cycles.

The *arid* and *semi-arid* countries of the Mediterranean combine a low rate of *rainfall* and a high rate of *evapotranspiration* and therefore only limited water quantities flow into rivers or percolate to *aquifers*. The availability of water may significantly vary during the different seasons of the year and from year to year. The *arid* and *semi-arid* regions of the Mediterranean are subject to extreme recurrent *droughts*. Scarcity is aggravated by varying degrees of exploitability, vulnerability and partition among different countries.

The *desert* occupies a considerable part of the North African countries and of those in the Eastern Mediterranean. In the North of Africa arid and desert climatic conditions prevail throughout the region except for the narrow coastal strip along the Mediterranean shoreline. Approximately 80% of total land area is occupied by the Sahara desert.

In the **Middle East** the Syrian Desert (Badiat El-Sham) occupies the eastern parts of Syria and Jordan, and the Negev desert encompasses the southern part of Israel extending south to the city of Eilat on the Gulf of Aqaba.

The Eastern Mediterranean belongs to one of the most *arid* regions of the world. The average annual rainfall varies considerably across this part of the region, ranging from less than 30 mm in the Arab area spanning southern Israel and Jordan and the Syrian Desert in the east, to the rather limited high rainfall area of Lebanon in the north, where 1000 mm are recorded. Because of the *aridity* in the region, the Levant is among the poorest regions in the world in terms of water resources. The average



internal renewable water resources are estimated at 15080 million m³/yr and the per capita share from these resources is 446 m³/yr, which is below the international standard of 1000 m³/yr defined as the “*water poverty line*”.

In **North Africa** total rainfall and distribution varies considerably with time and distance from the coast. The major part of the annual *precipitation* is concentrated in the winter months and in the northern parts of the countries: in Egypt, for example, the rainfall varies between 0 mm in the *desert* to 200 mm in the Mediterranean coast with an estimated overall annual average of 18 mm. In Libya the highest *rainfall* occurs in the north western region (Jabal Nafusa and Gefara Plain) and in the north eastern region (Jabal Akhdar), where the average yearly rainfall values are of 250-300 mm approximately. In Tunisia the average annual rainfall is around 594 mm in the north, 289 mm in the centre and 156 mm in the south with a maximum peak of 1500 mm in the extreme north to a minimum value of less than 100 mm in the extreme south. In Algeria the annual amount of rainfall in the north varies between 300 and 1000 mm, while in the Sahara and the South Saharan Atlas, the annual amount of rain is below 100 mm. In Morocco the average annual rainfall is about 340 mm varying from more than 450 mm in the north to less than 150 mm in the southeast.

The **Northern Mediterranean**, mainly European, with its abundance of *groundwater* and *surface water* resources and their regular recharge by a steady rainfall in most parts of the sub-region does not suffer generally of lack of water and, in this sense, it differs very much from the other sub-regions of the basin (North Africa, Middle East, Islands). All major Mediterranean *watersheds* (except for the river Nile) are located in this sub-region (Ebro, Rhone, Po, Neretva). Average annual rainfall ranges from 500 to more than 1000 mm/year. *Evapotranspiration* along the Northern Mediterranean coast is between 400-600 mm/yr. Mean annual *runoff* varies from 100 mm/yr along the Spanish coast to 400-500 mm/yr along the coasts of the Ligurian Sea and 300 mm/yr along the Adriatic coast.

The naturally occurring water resources of the **Mediterranean Islands** (this sub-region includes more than 4000 islands, belonging to 8 countries: Croatia, Cyprus, Greece, Italy, France, Malta, Spain and Tunisia) are very limited, fragile and threatened. From the 1000 Km³ of total rainfall per year in the Mediterranean, islands have a water crop around 32,75 Km³, corresponding to the 3,275% of this total value.

Freshwater availability solely depends on the amount of *precipitation* that falls on the specific island as there are no permanent rivers flowing and springs do not yield high flows.

Steep ground slopes, combined with sparse or non-existing vegetation cover and short length riverbeds reduce the time of concentration of *flood* flows - the only water available - resulting in quick discharge of water into the sea followed by extreme *soil erosion* and deprivation of the *aquifers* of valuable quantities of water.



Freshwater

1.2. NON-EQUITABLE ACCESS AND AVAILABILITY OF WATER RESOURCES

Water distribution

The variations in geography and climate, as well as the political and socio-economic differences that characterize the various Mediterranean subregions and countries, are reflected in the availability and access to water resources. Availability and access to *water supplies*, therefore, varies substantially between regions, countries and sites and is closely linked with poverty issues.

Divergences may be observed inside the different Mediterranean sub-regions that sometimes present numerous dichotomies with regard to availability of water and access to it. For instance, the Mediterranean presents remarkable disparities between its coastal and hinterland areas, due to the excessive growth of urban and coastal population and the related high *water demand*, which cannot always be supplied from nearby sources. The seasonal growth of population in many coastal areas, because of increased tourism during the summer months, frequently results in water crises i.e. water quantity and quality deterioration in several of these zones.

This situation is particularly serious in those countries, which have reduced investment possibilities because they do not have the means to effectively overcome *water supply* disruption and water pollution increase.

A further dichotomy is reflected in the different grades of economical development of Mediterranean countries. Better economic status, generally reflected in a higher level of GDP, could open many opportunities for the development and management of the water sector. Higher GDP levels generally result in a better state of water infrastructures including decreased water losses, better awareness of the population about water issues, increased transparency in water management, better possibilities for water infrastructure investments, etc. On the contrary, the lower level of economic development significantly reduces the water sector development opportunities, which could have negative impacts on the state and availability of water resources.

Moreover, there are differences between the EU countries and those that are in the process of joining the EU. Countries of the first group benefit to a great extent from the collective institutional and legal experience in handling water issues and, eventually, from the EU funds allocated to building or modernizing water infrastructures in compliance with its regulations, factors that help them to reduce water shortages and improve water quality.

Water and Poverty

The lack of convenient and affordable access to adequate quantities of safe water reduces a poor rural or urban household's consumption of other commodities and services, leaves it consuming less than the optimum quality and amount of water for good hygiene and impacts health and labour productivity of the household's members. It may also reduce income-generating opportunities of the household, thereby further reducing income and consumption.

WHO has established a norm of 20 litres per capita per day (lcd) for water use to satisfy the very basic personal and hygiene requirements. Of that amount, about 10 lcd serve drinking and cooking needs, while the remainder goes to bathing—particularly hand washing. When water is expensive, either in cash terms or in the time and energy needed to collect it, the poor often cut total consumption to 15 lcd or less and cut back on bathing, with possible related high health risks.

Recent draft reports of the World Bank (Bosch, C. et al, 2001) and the GWP (GWP, 2003, TEC, Background Paper N.8) on water and poverty have emphasized the gravity and urgency of the problem and the need for adequate and proper investment in water projects targeting directly or indirectly the poor as well as for increased efforts towards the protection of water resources and in *capacity building* and education that can effectively contribute to poverty reduction.

The significance that basic water and sanitation services for the poor assume when linkages with other dimensions of poverty are considered can be evidenced through the following table, extracted from a World Bank draft report of 2001 (see reference above):

Table 1: Linkages among scarcity of water and sanitation services and poverty

Poverty Dimensions	Key effects
Health	Water and sanitation related illnesses. Stunting from diarrhoea-caused malnutrition. Reduced life expectancy.
Education	Reduced school attendance by children (especially girls) due to ill health, lack of available sanitation or water collection duties.
Gender and social exclusion	Burdens borne disproportionately by women, limiting their entry into the cash economy.
Income/consumption	High proportion of budget used on water. Reduced income earning potentials due to poor health, time spent on collecting water or lack of opportunity for businesses requiring water inputs. High consumption risk due to seasonal or other factors.



Water

The *Water and Poverty* issue came very high in the political agendas of the 2nd World Water Forum (The Hague, March 2000) and the International Conference on Freshwater (Bonn, December 2001) and received the highest attention also in the Mediterranean preparations for the WSSD, in particular in the Ministerial Declaration for WSSD of the Contracting Parties to the Barcelona Convention (Monaco, 14-17 November 2001) in the Mediterranean and Arab/Mediterranean NGO Declarations (Nice, 13-14 January 2002 and Tunis-Kairouan 28-30 March 2002, respectively) and of course in the WSSD itself (Johannesburg, 26 August-4 September 2002).

The Mediterranean reality regarding the interrelation between Water and Poverty has been also discussed and recently assessed in several conferences and consultations, such as the Workshop on Water Valuing and Poverty in North Africa and the Middle East (Cairo, 19-20 December 2001) and at a special session of the GWP-Med Regional Conference on Effective Water Governance (Athens, 19-20 March 2002). In these occasions the necessity to solve the problem of water for the poor and its high urgency have been reiterated as well as the feasibility to challenge this issue through a real commitment and cooperation among all stakeholders involved in the management of water resources and services.

Box 1: The Water Poverty Index

The links between water availability, health, poverty but also social deprivation and environmental integrity are clearly put in evidence by a new index, the international *Water Poverty Index*. Developed by a team of 31 researchers in consultation with more than 100 water professionals from around the world, this index draws its results on countries 'water situation' through the evaluation of five water related dimensions: *resources, access, capacity, use and environmental impact*.

The Water Poverty Index (WPI) demonstrates the strong connection between 'water poverty' and 'income poverty' and that is not primarily the amount of water resources available which determines poverty levels in a country, but the effectiveness of how those resources are used.

An issue coming out throughout the development of the WPI is that poor people are generally considered as helpless people for whom the only solution is aid while, as William Cosgrove, Vice-President of the World Water Council and a contributor to the development of the WPI says, "the reality is that marginalized people are usually highly motivated to help themselves; they are very often held back by constraints imposed on them by society. In every case, these people should be looked upon as an important and powerful resource to be involved in planning and implementing solutions to their own water-related problems, whether accessing drinking water or adapting to *floods* and *droughts*".

The index, through its applicability at a variety of scales (national level, basin level, community level) is expected to become a useful tool supporting policy makers and stakeholders in the identification of problems and in the undertaking of the appropriate measures to deal with their causes.



1.3. DEMOGRAPHIC PRESSURES ON WATER RESOURCES

According to statistics the total population of all Mediterranean countries amounted in the year 2000 to 442,5 million, where average *population density* was approximately 50 persons per km².

Although population densities of any single Mediterranean country is not particularly high by world standards (except for some cases), density per hectare of *arable land* is sometimes very remarkable. For example Egypt has 2000 people per arable hectare, Israel, Jordan and Lebanon have more than 500 (GWP, 2002, *Water for the 21st Century: Vision to Action, Framework for Action for the Mediterranean* (FFA)). Other related sources of stress come from rapid urbanisation which increases the *demand* for high-quality water, without diminishing the demand for irrigation water.

Most countries in the region are experiencing rapid population growth. The high growth rates foreseen in the southern and eastern Mediterranean allow one to envisage an increased pressure over the water resources in many North African and Middle East countries. This is particularly important because population could double in the next 20 years and rural urban migration could provide additional pressures on the *water supply and management systems* in the big cities that are already highly stressed.

The north of the Mediterranean is also an area densely populated (estimations for the year 2000 refer to more than 269 million people living in this sub-region - more than half of the Mediterranean population in that year) and the resident population is therefore exerting constant pressure upon its water resources. The estimated average population density is 103 inh/Km², ranging from 78 in Bosnia-Herzegovina to 191 in Italy.

The sub-region as a whole will exhibit only modest population growth in the future (except Turkey and Albania) but its share of the total population in the region will still remain high in the future.

Although the situation of this region is much better than in other Mediterranean sub-regions thanks to the availability of plentiful water resources, there are some demographic parameters that indicate more disturbing developments in selected areas of the sub-region. Negative drivers in this sense are the growth of urban population and the growth of coastal population. Many urban agglomerations in the north experience water crises, particularly those in the coastal areas. There, *water demand* is high and water cannot be satisfactorily supplied from nearby sources. In order to avoid water shortages some cities are proposing costly solutions by planning to bring water from far away places (Istanbul is planning to bring water from two sources 50 and 200 Km away respectively, while Barcelona is planning to bring water from the river Rhône). However, this option is not available to many other urban agglomerations in the north.

Population

The temporary (seasonal) growth of population because of tourism activities is a growing concern in the sub-region. As a consequence, many coastal tourist areas are confronted with water crises in summer. Additionally, deterioration of the water quality, including *salinization*, is a frequent occurrence in coastal areas, particularly in tourist settlements. This, in turn, directly affects other sectors, such as agriculture.

Mediterranean Islands present an average *population density* of 98 inh/Km² with great variations in the islands themselves. Malta is the most densely populated, with a density of 1234 inh/Km², then the Italian islands follow with a density of 138 inh/Km² and third in order are the Balearic islands with a density of 124 inh/Km². However, these are the average figures for the native population, not taking into account tourism, which, in the smaller islands, may double or triple in the summer months and contributes significantly to the already existing *water stress*.

The population of the Mediterranean Islands is generally expected to increase at a rate of about 1% per year, from 10,663 million inhabitants in 1995 to approximately 12 million inhabitants in 2005. This increase does not take into account the permanent tourism, which is becoming a trend, but rather the resettlement of immigrants returning to their homeland and the population movement and relocation. It is also largely linked to the increasing numbers of economic refugees.

Tourism, a major activity for most of the islands, which today amounts to more than 20 million visits per year (GWP, 2002, Water for the 21st Century: Vision to Action, Framework for Action for Mediterranean Islands (FFA)) is expected to grow by at least 4% per year for the next 10 years, resulting in intensified urbanization and increased population concentration particularly in the coastal zones of many islands.

Table 2: Population data for all Mediterranean countries

	Population (thousands inhabitants)		Density	Rural %	Urban%	
Country	2000 ⁽¹⁾	2025 ⁽²⁾	2000	2000	2000	2050
Portugal	10300	9831	108	35,6	64,4	80,4
Spain	39500	40769	79	22,4	77,6	83,5
France	59000	64177	107	24,4	75,6	81,0
Monaco	34	41	22430	0	100	100
Italy	57800	53925	191	33,0	67,0	74,4
Malta	391	430	1234	9,5	90,5	94,6
Slovenia	1965	2029	98	49,6	50,4	56,8
Croatia	4473	4193	82	42,3	57,7	69,0
Bosnia Herzegovina	3972	4324	78	57,0	43,0	56,7
Yugoslavia	10856	12217	103	47,8	52,2	60,5
Albania	3114	3820	109	58,4	41,6	57,8

	Population (thousands inhabitants)		Density	Rural %	Urban%	
Country	2000 ⁽¹⁾	2025 ⁽²⁾	2000	2000	2000	2050
Greece	10600	10393	80	39,9	60,1	69,6
Turkey	67400	87303	86	24,7	75,3	75,4
Syria	16300	24003	87	45,5	54,5	63,2
Jordan	5040	8666	55	25,8	74,2	83,3
Lebanon	4000	4147	336	10,3	89,7	93,5
Israel	4370	7861	273	8,8	91,2	94,3
Palestinian Authority ⁽³⁾	3150	6072	514	5,4	94,6	75,2
Cyprus	759	900	85	43,2	56,8	77,8
Egypt	64700	94895	68	54,8	45,2	51,4
Libya	6038	8832	3	12,4	87,6	91,5
Tunisia	9560	12892	58	34,5	65,5	76,9
Algeria	30400	42329	13	39,7	60,3	69,7
Morocco	28700	38174	67	43,9	56,1	68,9

Sources:

⁽¹⁾ MEDSTAT (Euro-Mediterranean Statistics) and Blue Plan, Demographic indicators (www.planbleu.org)

⁽²⁾ Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: the 2000 Revision and World Urbanization Prospects: the 2001 Revision, Medium fertility variant (<http://esa.un.org/unpp>).

⁽³⁾ Also referred as Occupied Palestinian Territory, United Nations at <http://unstats.un.org/unsd/methods/m49/m49alpha.htm> and International Organization for Standardization ISO 3166-1:1997 Codes for the representation of names of countries and their subdivision - Part 1: Country codes at <http://www.iso.ch/iso/en/prods-services/iso3166ma/02iso-3166-code-lists/list-en1.html>

Urbanization and big cities

Statistics show that the average *urbanization rate* in the North African countries is projected to increase from 62,94%, as by the year 2000, to 71,68% in 2050 (see Table 2). In Middle East countries, where rates are at present already very high, the percentage of the urban population is expected to increase from 80,84% to 81,90%. Finally, the North Mediterranean sub-region will show significant urbanization rate increases from 63,74% to 72,00%.

While the resident population of the biggest cities in the EU Mediterranean countries is expected to stabilize until 2015, statistics show that the major cities of the southern and eastern Mediterranean countries will be subjected to a further growth of their population, which will result in increased pressures on their *water supply and management systems*.

Estimations on the growth of urban centres in the Mediterranean (2000-2015) are presented in the following table:

Table 3: Growth of Urban Centres in the countries surrounding the Mediterranean (2000-2015) in millions of inhabitants

Country code	City	2000	2005	2010	2015
DZ	Algiers	2,76	3,27	3,74	4,14
EG	Cairo	9,46	10,09	10,77	11,53
EG	Alexandria	3,51	3,75	4,02	4,33
EG	Shubra el Kheima	0,94	1,03	1,13	1,23
ES	Barcelona	2,73	2,73	2,73	2,73
ES	Madrid	3,97	3,97	3,97	3,97
FR	Marseille	1,30	1,32	1,34	1,36
FR	Paris	9,63	9,75	9,82	9,85
GR	Athens	3,10	3,10	3,10	3,10
IL	Tel-Aviv	2,00	2,13	2,27	2,40
IT	Rome	2,65	2,65	2,65	2,65
IT	Milan	4,25	4,25	4,25	4,25
IT	Naples	3,01	3,01	3,01	3,01
IT	Turin	1,29	1,29	1,29	1,29
JO	Amman	1,15	1,31	1,48	1,65
LB	Beirut	2,07	2,28	2,42	2,50
LY	Tripoli	1,73	1,94	2,12	2,27
MA	Casablanca	3,36	3,78	4,22	4,61
MA	Rabat	1,61	1,88	2,13	2,34
MA	Fez	0,90	1,04	1,18	1,30
MA	Marrakech	0,82	0,96	1,10	1,21
PT	Lisbon	3,86	4,23	4,47	4,54
SY	Damascus	2,14	2,43	2,78	3,17
SY	Aleppo	2,23	2,62	3,05	3,49
TN	Tunis	1,90	2,07	2,25	2,41
TR	Istanbul	8,96	9,95	10,72	11,36
TR	Ankara	3,16	3,38	3,58	3,78
TR	Izmir	2,21	2,39	2,55	2,70

Source: UN Population Division, World Urbanization Prospects: The 2001 Revision

Population and coastal regions

Together with urban areas, the Mediterranean coastal zone hosts the majority of the population.

In most of the North African countries, for example, around 50%-90% of the population is concentrated along the Mediterranean coast due to the harshness of living conditions in the Sahara desert.



Density

Box 2: Coastal Population density index

Coastal population density is defined as the ratio of the permanent population in a coastal area to its surface area. The national coastal region is made up of the aggregation of administrative areas equivalent to level 3 of the Statistical Territorial Unit Nomenclature (NUTS 3), such as for example French departments, wilayas in Algeria and provinces in Italy, around the Mediterranean outline. This indicator is very useful at infra-national level. It allows the assessment of demographic pressures and of local demand for services, environmental structures, sanitation, waste management, etc., in the coastal areas. By comparing it with national density, territorial imbalances and the pulling-power of the coastline become clear.

Source: Blue Plan, Territory and Human Settlements – Littoral and littoralisation: Population density in coastal regions, Fiches Indicateurs n. 31.

Statistical data for 1995 (Portugal and Jordan are not included in the calculations as they don't have a Mediterranean coastline) show that the Mediterranean coastal zone had a population of 139,3 million inhabitants and an average density of 96 inh/Km² compared to 47 inh/Km² which was the average density for the whole of the countries that year.

Monaco (15.800 inh/ Km²), Malta (1.178 inh/ Km²) and Gaza (2.241 inh/ Km²) had the three highest population densities in the Mediterranean basin. Ten countries had a coastal density higher than 100 inh/Km²:

Table 4: Mediterranean countries with coastal densities over 100 inhab/Km²

Country	Density	Country	Density
Spain	160	Tunisia	141
France	132	Israel	243
Italy	198	Lebanon	509
Albania	146	Syria	337
Algeria	178	Turkey	102

Source: Blue Plan.

In Europe, Italy had the highest density with 198 inh/Km² and Bosnia Herzegovina the lowest with 44 inh/Km², followed by Yugoslavia (61 inh/Km²), Croatia (62 inh/Km²), Greece (92 inh/Km²) and Slovenia (98 inh/Km²).

In the southern Mediterranean coastal region Libya had the lowest density with 12 inh/Km². It was followed by Cyprus (80 inh/Km²), Egypt (92 inh/Km²) and Morocco (99 inh/Km²).



With 178 inh/Km² along the coastline (12 inh/Km² on the national territory), Algeria had a very high concentration of population in the coastal regions: 43% of the population lived along the coast, which is only 3% of the, composed mainly by *desert*, national territory. Syria had a similar situation with coastal densities almost 5 times superior to the national figures. The coastal regions of the delta of the Nile in Egypt were also very densely populated.

Statistics show that in European coastal areas, increases in population density seem to gradually level off. This is very clear in Italy, where a slight decrease in density has been observed between 1990 and 1995.

1.4. POLLUTION, WATER RESOURCE DEGRADATION AND WASTEWATER TREATMENT AND REUSE

Water resource degradation and lack of access to adequate quantities of clean water place severe burdens on the health of humans and ecosystems. The impacts of inadequate water services, in most cases accompanied by the effects of inadequate sanitation services, falls primarily on the poor. In fact although both poorer and higher income segments of the population may face the same polluted resources or inadequate services, higher income households, usually located in better developed sections of cities, are often better served through water and sanitation systems than the poor districts. Higher income households can also afford to buy bottled drinking water, if needed, which is not the case with the poor.

One of the major threats for water resources in the region is the direct health risk of discharges of untreated *sewage* to underground and *surface water* resources, particularly when unregulated settlements occur in the *drainage basins* or when fields are watered with *raw sewage*. Availability of good quality water is compromised also by the uncontrolled disposal of urban and industrial sewage discharges and by the unsafe and improper disposal of solid and toxic wastes from industrial, agricultural and other human activities.

In many countries pollution renders resources unusable, or raises the cost of purification for drinking purposes to unacceptable levels. Groundwater is the most vulnerable to pollution, because the process is not reversible and the diminished quality could permanently affect running water. Surface water accumulated in reservoirs, as well as in natural lakes, is frequently threatened by *eutrophication*. This phenomenon is caused by *runoff* from fertilised agricultural lands, by direct discharges of sewage and other organic inputs and it too increases the costs of producing drinking water.

Less industrialized, water-scarce countries in the south and east are also affected by pollution that tends to spread and increase faster despite the efforts made to prevent it.



Wastewater

Available resources and particularly those of good quality, easily mobilised (made available for use) water, are decreasing in most Mediterranean countries and are becoming scarce especially in the south and east. The costs of mobilising them are ever increasing.

In the North Mediterranean sub-region there is an increasing trend towards investments in improving water quality, particularly through construction of *wastewater treatment plants* in coastal areas (France, Spain, Italy and Greece). EU regulations and Directives have greatly encouraged this practice.

However, this is a very limited phenomenon in the whole of the region. In most countries of the south and the east, *wastewater* is still not, or is insufficiently, purified (40 km³ per year of wastewater is discharged from the entire Mediterranean region) with grave impacts on health, sanitation and availability of quality water for Mediterranean populations.

Wastewater treatment practices and *reuse* are practiced as an integral component of wastewater management and environmental protection strategies only in Israel, Tunisia and to a certain extent in Jordan. About 80% of Israel's treated wastewater is reused in irrigation. In Jordan, all of the treated wastewater collected from the As-Samra wastewater plant is blended with fresh water from the King Talal reservoir and used for unrestricted irrigation downstream in the Jordan Valley.

The main problem related with *wastewater reuse* is the threat to public health, soil and water if it is not done carefully. In developing countries the main impact on health from wastewater reuse is from helminthic diseases, while microbial pathogens are the second largest threat. The worst case situation is when untreated wastewater is used to irrigate vegetables or salad crops that are eaten raw. This practice resulted in the cholera outbreak in Amman in 1981. Unfortunately, there are many examples of this on-going practice, such as the continued irrigation of market vegetables, mostly eggplants and cucumbers, with raw wastewater flowing in the Kedron Valley, West Bank, due to *freshwater scarcity*. Wastewater components, highly toxic to some crops, include sodium chloride and boron. Wastewater can also salinize soils and the grease contained in its raw state can reduce soil permeability and aeration by clogging pores. Both microbial pathogens, and over the long term, nitrates, from wastewater can contaminate shallow aquifers.

Landfilling of waste can result in *aquifer* pollution and in the case of *transboundary aquifers* effects are even more serious as the polluted groundwater can travel from one side to the other impairing good water quality availability in the different countries sharing the aquifer.

Moreover, poorer quality water from the coastal area or inland saline water bodies can be mobilised, as a result of intensive groundwater abstraction. For example, in case of additional extraction in Siwa (Egypt) and eventually new development in



Jaghbub (Libya) the saline water contained in this shared aquifer, currently some 20-25 Km north of Siwa, would probably migrate towards the development areas, mainly towards Siwa. Quality deterioration from vertical leakage can also occur. In arid regions some topographic depressions favour *evaporation* of groundwater due to high piezometric levels and create sabkhas, flat and very saline areas of sand or silt lying just above the water-table (normally of poor quality) that have been formed by evaporation of ground water seepages. Production from deeper, better quality aquifers can result in pressure changes and consequent reversal of leakage and invasion by poor quality water.

Disasters

1.5. NATURAL AND ANTHROPOGENIC DISASTERS AND CLIMATE CHANGES

The effects of climatic uncertainties, such as decreasing *precipitation*, higher frequency of extreme *rainfall* and *droughts*, are a reality in the Mediterranean region and *climate change* is considered a long-term risk.

Floods caused by violent surges in Mediterranean watercourses, as well as landslides and mudslides due to extreme rainfall levels, represent the main risk of natural disaster in the region. Moreover, the risks are amplified by the growing concentration of populations and human activity in exposed areas. During the 20th century, at least 15 floods claimed 100 to 1000 victims each (Villeveille, A., 1997) in Mediterranean countries.

Floods are a frequent phenomenon in most of the region, such as in northern Italy and the Balkans. In the south they are rarer but of greater intensity.

Preventing these risks is a major objective of water management, along with the mobilisation of resources in a large number of Mediterranean basins.

Naturally occurring water does not always act to the benefit of the environment. *Soil erosion* caused by *rainfall* and uncontrolled run-off has been a constant problem in a number of Mediterranean basins. Eroded soils increase the irregularity of water flow.

Droughts are recurrent events, more difficult to deal with as *water scarcity* increases. Even if their occurrence remains unchanged, the sequences of long-term droughts are increasingly disastrous. The high consumption rate of resources during wet seasons increases the risk of an acute drop in water availability in times of drought, whilst, at the same time, safety demands and the need for a regular supply increase.

Nearly everywhere relatively severe year long droughts occur at least every 10 years. Consecutive drought years are not infrequent in the Mediterranean. They



are a main concern in the islands, in the countries of North Africa and the East Mediterranean. In the countries of the north, droughts are mainly confined to coastal areas, although in some, such as eastern and southern Spain and southern Italy, it also reaches inland. Droughts aggravate the situation, causing water reserves in soils and subsoils to dry up. During the last few decades, most Mediterranean countries have experienced memorable long-term droughts, for example: 1980-85 in Morocco, 1982-83 in Greece, Spain, Southern Italy and Tunisia, 1985-89 in Tunisia, 1988-90 in Greece, 1988-92 in Mediterranean France, 1989-91 and 1995-98 in Cyprus, 1990-95 in Spain and Morocco, 1993-95 in Tunisia and 1995-96 in Sardinia. This list is far from exhaustive.

The response and measures taken by the various governments to address the issue differ considerably both in nature and in the obtained results. The increase of the price of water in combination with legal restrictions and wide awareness campaigns seem to have resulted in impressive reductions in water consumption (Scoullou, M. and B. Mantzara, 1996).

Water resources in the Mediterranean countries can be also affected by *climate changes* caused by the *greenhouse effect*. The effects and the extent of these changes are as yet uncertain and cannot be easily quantified or foreseen. A certain consensus exists, however, regarding a presumed increase in climatic contrast. In the south, a drier climate is probable in the 21st Century and it will have the dual effect of reducing resources and increasing *water demand*, by intensifying *evaporation* and accentuating droughts. In the north, we can expect the climate to become more contrasted with more rainfall in winter and drier summers, with less regular rainfall that could influence water production and increase water demand in summer.

Climate changes can have considerable impacts also on *transboundary aquifers*. In some regions they will result in increasing recharge and in others in reducing it. The consequences of either of these impacts on abstraction, maintenance of *wetlands*, discharge to water bodies could be very serious. Global sea level changes, may impact salt water intrusions, thus affecting groundwater quality.



Degradation

1.6. BIODIVERSITY LOSS AND DEGRADATION

Over-abstraction of groundwater and high mobilisation of *surface water* have an important impact on the health and integrity of aquatic ecosystems. Although little information has been provided, some countries (Tunisia) apply restrictions of water use from lakes, etc. to ensure that ecological needs are fulfilled. Others (Spain) require that rivers have a minimum 'ecological flow'. Artificial water recharge and use of *aquifers* for storage of surface water during the rainy years has also allowed Tunisia to increase the level of the water table and improve the

chemical parameters of water quality. The effects of limiting the ecological functions of water is alarming as are the future risks caused by the overuse of water resources. Protected *wetlands* are a fundamental part of the natural landscape and fulfil numerous functions (recycling of fresh water, protection of fauna and flora, maintenance of the ecological balance, etc.). In the past, wetlands were abundant in the Mediterranean basin. During the 19th and 20th centuries most continental wetlands were drained either for agricultural purposes or as part of the fight against mosquitoes and malaria or for urban development and airport construction. Today, more than half of these *wetlands* are lost and in some places this proportion is as high as 90% or more.

There are numerous examples of ecosystems that depend partly or totally on groundwater and *transboundary aquifers*. Since an *aquifer* system is essentially below ground, biodiversity issues generally relate to the regions where aquifers discharge through rivers, lakes or swamps. Such water bodies frequently have specific characteristics, related to the physical and hydrochemical features of the aquifer that create special ecosystems.

In many regions, and especially the *arid* ones, groundwater fed water bodies can be absolutely critical for the maintenance of *biodiversity*. Even in temperate climates, the discharge region of a transboundary aquifer can provide specific conditions of quality, temperature and nutrients that rare species will be reliant upon.

In Tunisia, in the Ichkeul National Park, the Ichkeul Lake and related swamps rely in part on groundwater discharge to provide seasonal fluctuations in salinity, which ranges from low levels in winter up to 30-40 g/l in summer. The conditions are essential for maintaining populations of bird fowl, fish and ecological fishing compartments and their relationships. The Azraq lakes in Jordan are another example of a *surface water* body supported by the transboundary flow in aquifers. These lakes are an important stop-over and watering point for annually migrating birds. In recent years with the intense abstraction of groundwater the size of the lakes has been reduced drastically thus having a serious impact on the trans migratory routes of birds.



1.7. OVER-EXPLOITATION OF WATER RESOURCES AND TRENDS

“Water stress” is generally the result of excessive abstraction of water compared to the resource available in a particular area.

The level of exploitation of water resources is generally high in most countries and pressure on water resources is increasing. Exploitation ratios can be over 50%, or even nearing 100% in various parts of many Mediterranean countries (Egypt, Occupied Palestinian Territory, Israel, Libya, Malta, Tunisia, most Islands and the

eastern regions of Spain). Exploitable amounts of water are decreasing, and may become scarce over time in many regions. Disruption between *water demand* and renewable conventional supply may increase. Overexploitation of local water is a common practice that leads to salt-water intrusion.

Most North African and East Mediterranean countries predict an increase in pressure on their water resources because of the high population growth in the region, which in some areas could double in the next 20 years. Rural urban migration could provide additional pressures on the *water supply and management systems* in the big cities that are already considerably stressed and in coastal areas where most of the population is concentrated.

Full exploitation of available water resources is becoming a common problem in the Mediterranean islands. Most islands use all renewable groundwater and overabstract their resources at an ever increasing cost as the water table goes down. Some islands are dependent on expensive transportation of water from the mainland because of structural shortcomings (Greek islands, Croatian islands) or droughts (Majorca has had to import water by boat at \$2 per m³). Surface water has also been fully exploited by building reservoirs in most islands wherever possible.

In the countries of the north that do not have recurrent problems of water availability (France, central and northern Italy, inland Greece, northern Spain, Turkey and the Balkans) there is no widespread need (except in some specific situations in coastal areas) for costly alternative solutions to provide water. In some cases there are even over-investments in exploiting new sources of water.

On the positive side, it should be mentioned that there is a general *trend of decreasing* water consumption, overall and per capita, in most of the countries of the sub-region. In some countries this has been achieved by economic measures implemented in the water sector in recent decades, i.e. incentives, more appropriate tariff policy, shift towards urban uses of water, improvements and investments made in making water distribution networks more efficient. This is the situation in countries of the European Union and, to a certain extent, in Turkey. On the other hand, in countries with economies in transition, the decrease in water use is mainly due to the downscaling of economic activity. Thus, for example, in Croatia, as well as in the rest of the Balkan countries, between 1987 and 1997 water consumption has decreased by 30%. Croatia has suffered a considerable decrease both in tourism and in industrial activity, as well as from the lack of needed investments for the maintenance and expansion of *water supply* networks. Wars in the Balkans have significantly aggravated this situation.

In some countries, the decreasing trend in water consumption could be attributed to the implementation of *conservation measures*. Furthermore, it is noteworthy that current losses in water networks of the Mediterranean range from 10 to 70%.



Table 5: National water resources availability and withdrawal

	Renewable Water Resources (Km ³) 2002	Total Water Withdrawal (Km ³) 2001	Groundwater Recharge (Km ³) 2000-2001	Total Groundwater Withdrawal (Km ³) 2000-2001
Country				
Portugal	38,0	7,29	5,1	3,1
Spain	110,3	30,75	28,9	5,4
France	170,0	37,73	100,0	6,0
Monaco	N.A	N.A	N.A	N.A
Italy	159,4	56,20	43,0	13,9
Malta	0,0	0,06	0,1	0,0
Slovenia	18,5	0,50	N.A	0,2
Croatia	61,4	0,76	11,1	N.A
Bosnia Herzegovina	35,5	N.A.	N.A	N.A.
Yugoslavia	44,0	N.A.	3,0	N.A
Albania	44,5	0,20	7,0	0,6
Greece	45,2	5,04	10,3	2,0
Turkey	196,0	31,60	20,0	7,6
Syria	7,0	14,41	6,6	1,8
Jordan	0,7	0,98	0,6	0,5
Lebanon	4,8	1,29	4,8	0,4
Israel	1,7	1,90	0,5	1,2
Palestinian Authority	N.A	N.A	N.A	N.A
Cyprus	0,9	0,21	0,3	0,1
Egypt	1,8	55,1	1,3	5,3
Libya	0,6	4,60	0,7	3,7
Tunisia	3,5	3,08	4,2	1,6
Algeria	13,9	4,50	1,7	2,9
Morocco	30,0	11,05	9,0	2,7

Source: UNEP, 2002, GEO-3 Data Compendium CD ROM.

N.A: Non Available

1.8. AGRICULTURE AND TOURISM

With regard to water, two economic activities should be highlighted in most Mediterranean countries: agriculture and tourism.

The role of agriculture in Mediterranean water scarce countries is a main issue in relation to sustainable water management as irrigation agriculture is the biggest consumer of water.



In North Africa, agriculture accounts for a higher percentage in national GDP than in other subregions. It ranges from 13% in Morocco to 17% in Egypt. It is important, moreover, because of the share of the population that lives on agriculture. Employment in the agricultural sector ranged in 1990 from 28% in Tunisia to 45% in Morocco. A major concern in these countries is that ensuring livelihoods in rural areas would help curb urban growth, thus stabilising population in rural areas.

In the East Mediterranean countries, agriculture is the principal user of water. In Syria, agriculture is the most water intensive user and accounts for 28,5% of GDP, 33% of labour force and 94% of water withdrawal. In other countries agriculture plays a relatively small to moderate economic role: in Lebanon, it accounts for 12,4% of GDP, 7% of labour force and 68% of water withdrawal; in Israel, 4% of GDP, 4% of labour force and 79% of water withdrawal; in Jordan, 6% of GDP, 2,6% of labour force and 75% of water withdrawal; in the Occupied Palestinian Territory, 33% of GDP, 13% of labour force and 64% of water withdrawal.

Agriculture is a rather small contributor to GDP in the islands and Mediterranean Europe. There has been little reduction of water allocated to irrigation in water scarce countries in this area and the percentage use of water in irrigation varies from 12% in Malta to 74% in Cyprus. Developed countries of this sub-region, Spain, Italy Greece and Portugal (France excluded) also use plenty of water for agriculture. This shows that water in agriculture is not efficiently used. There are political and social reasons why this is so. In some countries, the cost of water is kept artificially low through subsidies (i.e. Greece) or the Government heavily invests in rural areas (Turkey) in order to curb migration flows from rural towards large urban areas.

In some cases less water intensive farming (choices of crops that do not require too much water, especially if they are not strategic for nourishment but are of a speculative nature: for example melon and water melon cultures, which are big water consumers) can help to curb water consumption.



Table 6: Socio-economical parameters related to agriculture in the Mediterranean countries

	GDP from Agriculture (%) (1)	National Water Withdrawal from Agriculture (%) (2)	Employment distribution in Agriculture (%) (3)
Country	1999	2001	1990
Portugal	3,0	48	N.A
Spain	3,8	62	12
France	2,8	15	5
Monaco	N.A	N.A	0

	GDP from Agriculture (%) (1)	National Water Withdrawal from Agriculture (%) (2)	Employment distribution in Agriculture (%) (3)
Country	1999	2001	1990
Italy	2,8	59	9
Malta	2,7	12	3
Slovenia	3,7	0	6
Croatia	8,6	0	16
Bosnia Herzegovina	15,5	N.A	11
Yugoslavia	N.A	N.A	30
Albania	52,6	76	55
Greece	6,7	63	23
Turkey	15,8	72	53
Syria	28,5 (1990)	94	33
Jordan	2,4	75	2,6
Lebanon	12,4 (1995)	68	7
Israel	(4)	79	(4)
Palestinian Authority	(33)	(64)	(13)
Cyprus	3,4	74	14
Egypt	17,4	86	40
Libya	3,2	87	11
Tunisia	N.A	89	28
Algeria	11,4	60	26
Morocco	14,8	92	45

Sources:

(1). *The International Bank for Reconstruction and development/The World Bank, World Development Indicators 2001, National Gross Domestic Product - from Agriculture: 2001, as included in the GEO-3 Data Compendium CD-ROM (UNEP, 2002).*

(2). *Food and Agriculture Organization of the United nations (FAO), 2002, National Water Withdrawal - from Agriculture as included in the GEO-3 Data Compendium CD-ROM (UNEP, 2002).*

3(). *GWP, 2002, Water for the 21st Century: Vision to Action, Framework for Action for the Mediterranean (FFA).*
N.A: Non Available

Box 3: Agriculture and GMO

Recent discoveries in biotechnology and genetic engineering are opening new perspectives for the cultivation of crops and plant species better adapted to dry climates, *drought* and saline conditions and therefore able to withstand long

periods of drought, reduced water availability as well as high salt contents in soil and groundwater. At the same time concerns and fears have been expressed about their unknown future impacts. The term GM foods or GMOs (*genetically-modified organisms*) is most commonly used to refer to such kinds of crop plants created for human or animal consumption using the latest molecular biology techniques which permit the identification and transfer of a specific gene that creates a desired trait in a plant, and offer a more precise way to produce plants with certain beneficial characteristics. Great debates have arisen between those who see these applications in the agricultural field as the panacea for many of the real problems affecting this sector and those who reiterate the possible risks for health and the environment deriving from the use of such organisms, whose effects and widespread consequences cannot be foreseen or predicted in a secure way. Most concerns about GM foods fall into three categories: environmental hazards (unintended harm to other organisms, gene transfer to non-target species and reduced effectiveness of pesticides), human health risks (allergic reactions, unknown effects on human health) and economic concerns (costly returns expected by agri-biotech companies on their investments reflected on the high costs of GM plants and seeds).

Tourism is increasingly becoming the most important economic sector in many Mediterranean countries and islands. The Mediterranean basin is the world's leading tourist destination with 220 million tourists visiting the region every year (www.panda.org, Mediterranean Programme: Key threats in the Region – Tourism and population pressure). In some, it has already been the major economic activity, while all other countries are placing great hopes in this sector to become a major driving force towards their future prosperity. However, for tourism to be productive and sustainable the tourist carrying capacity of the area should not be surpassed. Water may eventually become the limiting factor for such development (Scoullou, M. et al, 1999). Since tourism is mainly concentrated in coastal areas that are already suffering from occasional water shortages, this new trend is additionally increasing *water demand* and aggravating the problem of shortages, especially in summer. An indicative example of this is Spain: the population of 27 municipalities on the Costa Brava swells from 150,000 in winter to 1,1 million in mid-August.

Widespread, unsustainable tourism models are examples of irrational utilization of water that further pressure available water resources in many Mediterranean countries. The supply of water intensive recreational activities and services are very appealing to the tourists, but extremely damaging for the local communities and the local ecosystems. Consider, for example, golfing, which presupposes huge landscape transformations and the construction of various facilities associated to the golf courses and the provision of various other commodities to visitors. Golf courses require considerable quantities of water for their maintenance: a field of 45-50 hectares requires $1,5-2 \cdot 10^3 \text{ m}^3$ of water per day. This corresponds to the needs of a clover crop all the year round. Many areas in the Mediterranean that host numerous golf fields have already overcome their carrying capacity for water resources and are under water stress.

CONFLICTS

1.9. SHARED WATER SYSTEMS AND WATER CONFLICTS

Water can become an issue of geopolitical significance not only because it may be scarce in densely populated regions, but also because it may be shared across national boundaries. No region of the world with shared international water is exempt from water-related controversies, though the most serious problems do occur in water-scarce regions. Seasonal and regional water shortages, unequal distribution and misuse of this resource may exacerbate social tensions and in extreme cases, precipitate violence. Such conflicts, tensions and frictions are expected to increase as growing populations, urbanization and economic development will require more water for agricultural, municipal, tourist and industrial uses. At the same time, broad questions of environmental preservation will persist and allocation patterns, especially of shared water resources, will continue being demanding and controversial.

There are several well-known cases of diplomatic conflict over water in the Mediterranean. Some have been solved to a certain degree (i.e. between Spain and Portugal over a number of shared river basins and in the Nile River Basin, see Box p.50). Others have not and there is still some disagreement over shared waters (between Syria, Iraq and Turkey over the Tigris and Euphrates; between Jordan, Israel, the Occupied Palestinian Territory, Syria and Lebanon over the relatively small Jordan *river basin*, etc).

The manner in which groundwater is used is influenced by socio-economic, institutional, legal, cultural, ethical and policy considerations, much more so than *surface water*.



Some transboundary, groundwater resources (aquifers) contain considerable fresh water quantities, enough to provide safe and good quality drinking water for many years. *Aquifer* systems, due to their partial isolation from surface conditions, on the whole, may contain water of excellent quality. In many countries these systems have been fully evaluated and extensively used to satisfy local, municipal and other demands. Such resources represent a substantial hidden capital that still needs prudent management. The issues for competition over internationally shared *groundwater* and aquifers are not always obvious and may only become apparent when exploitable groundwater has been exhausted or damaged beyond economic 'repair', limiting the capacity to support current and future social and economic use.

In particular, *transboundary aquifers* with minor contemporary recharge, but of a large volume, often referred to as "fossil water", can be drawn on for limited time periods. The amount and rate of extraction by each country should therefore be subject to multilateral agreements ensuring that each sharing country accepts the mutual effects -even if slightly detrimental, on its own resource and of groundwater development in the partner countries. Examples of transboundary aquifers with minor contemporary recharge in the Mediterranean are:

- Algeria, Tunisia and Libya sharing the Northern Sahara Aquifer System, mostly developed in Algeria and Tunisia.
- Libya, Egypt, Sudan and Chad sharing the Nubian Sandstone Aquifer System, developed only in Libya and Egypt.
- Egypt and Israel sharing the Nubian Sandstone aquifer in Sinai and Negev.
- Jordan and Saudi Arabia sharing the Saq aquifer.

In most of these cases, no substantive formal agreement exists so far, but studies are in progress, sometimes sponsored by international organizations to establish the base of agreements regulating the groundwater extraction in each of the concerned countries.

The Nubian Sandstone Aquifer System (NSAS)

The NSAS consists of a series of *aquifers* laterally and/or vertically interconnected, extending over more than 2 million Km² in east Libya, Egypt, northeast Chad and north Sudan. The *aquifer* system extends over the whole Nubian Basin, and is becoming very saline in the northern part. Major recharge took place in the last pluvial period and at present there is slow discharge from the aquifer system, while responding to the current climatic conditions (Puri, S. (ed) et al, 2001).

Most of the present water extracted from the NSAS is used for agriculture, either for large development projects in Libya or for private farms located in old traditional oases in Egypt (New Valley). However, an important project designed for transporting water to the coast from the NSAS is under development in Libya and is already supplying some 70,10⁶ m³ of water to Benghazi and to major coastal cities west of Ajdabyia.

The large groundwater development projects planned in the southern part of Egypt and Libya within the Nubian basin are not expected to induce any significant effect beyond the common border between the two countries.

In the North, the groundwater development in Siwa oasis (Egypt) from the deep aquifer (Nubian) is geographically close to a freshwater/saltwater interface and the increase of the present abstraction may draw saline water into the freshwater aquifer. The development of a well field in Jaghbub area, located in Libya in a position symmetrical to that of Siwa, with reference to the border, would probably augment the risk of deterioration of the water quality in the Nubian *aquifer* to the detriment of all beneficiary countries.

The Euphrates and Tigris case

There is a very long history of hydropolitical tension over the Euphrates and Tigris rivers, both of which have their sources in Turkey and flow through Syria into Iraq.

Serious tension has arisen twice in recent history: in 1975 between Syria and Iraq after Syria built the Ath-Thawrah Dam threatening, according to claims, the livelihoods of



3 million farms and in 1990, which saw Syria and Iraq united in their dispute against Turkey's South-Eastern Anatolia project (GAP). The latter conflict was caused by Turkey's plans to construct 38 major hydroelectric and irrigation works on the upper reaches of both rivers that could eventually result in the diversion of almost half of the Euphrates water that now crosses the border into Syria and well over two-thirds of the river's flow into Iraq. The problem remains still unresolved (2003).

Turkey and Syria represent opposite ends of the spectrum on the question of national sovereignty over international watercourses. Turkey promotes the theory of *absolute territorial sovereignty* over all watercourses as long as they flow on or under Turkish soil, whereas Syria is notably one of the few States in the world to have ratified the 1997 UN Convention (see page 65), which significantly restricts national sovereignty over international watercourses and recognises the rights of downstream countries and of fellow *riparians*. Iraq follows the principle of *absolute territorial integrity* and therefore objects to both Turkey and Syria's use of the water as it reduces the flow that would otherwise naturally enter into Iraq.

River basins shared by Portugal and Spain

Portugal's vulnerability in terms of water shortage, is dependent on natural and exploitation-related factors, i.e. the typical Mediterranean characteristics of its climate, with great seasonal asymmetry, both in terms of distribution over the year and in great spatial contrast with a rainy northern region and a *semi-arid* southern region, and its water consumption patterns (80% of the water consumption goes for irrigation with peaks of consumption at times when there is less water available). An additional significant factor however, is that Portugal is downstream and about 50% of all water resources come from Spain. More than half of Portugal is located in *river basins* shared with Spain. The percentages of areas in Spain and Portugal in the four main river basins are as follows: for the river Minho, 95% of the area in Spain to 5% in Portugal, for the river Douro, 81% to 19%, for the river Tagus, 69% to 31% and for the river Guadiana, 83% to 17%. In terms of flows, 94% of the Minho is in Spain, as well as 65% of the Douro, 66% of the Tagus and 75% of the Guadiana.

The economic and social progress of recent decades has led to an increase in the use of the waters in the Luso-Spanish *catchment areas* in both Portugal and Spain, which, if continued at the present rate, may eventually jeopardize the balanced and enduring development of the two nations. The results of the analyses of the water quality in the frontier section reveal a degradation of chemical quality that threatens its suitability for numerous purposes and its environmental integrity. Similarly there has been an alteration in the hydrological regime of the shared rivers, with a sometimes very significant reduction in the flows reaching the border.

The water resources of the shared catchment areas have been one of the most sensitive issues in Portuguese - Spanish relationships in the past.



The signature of the Albufeira Convention on Cooperation for the Protection and Sustainable Exploitation of the Luso-Spanish Catchment Areas (30th November 1998) marked the start of a new chapter in the relations between the two Iberian Peninsula States with regard to shared water courses. Although criticized by various groups and accused of bearing many weaknesses and being very biased, the Agreement, which is already in force, could inaugurate a new and important era of bilateral cooperation in the management of shared catchment areas. There is a bilateral Committee for the Application and Development of the Convention that acts as a working group of the superior body, the Ministerial Conference. A distinct characteristic of the Convention is that the operational structure for water-quantity management (water sharing, *flood* warning) is much more developed than that for water-quality management.

1.10. ENVIRONMENTAL REFUGEES

The gravest effect of environmental disasters and of *climate change* may be that of human migration as millions are uprooted by shoreline erosion, flooding and agricultural disruption.

The specific term created for describing people who can no longer gain a secure livelihood in their homelands because of *drought*, *soil erosion*, desertification or other environmental problems, many of them related to water “anaemia”, is the one of “environmental refugees”. In their desperation they feel they have no alternative but to seek sanctuary elsewhere, however hazardous the attempt might be.

At the end of the 80s and the beginning of the 90s there were already at least 10 million of these destitutes or almost as many as all other refugees (political, religious, ethnic) combined. This figure is certainly on the low side since governments generally take little official account of this unconventional category of refugees. Not all environmental refugees flee their countries; many of them are “internally displaced”, but all have abandoned their homelands on a permanent basis, having no hope of a foreseeable return.


Consider the prospects for Egypt in relation to global warming. The Nile river supports a 9,6 Km - wide strip of farmlands plus the delta plain, totalling 3,5% of national territory. In this area the *population density* is very high. Egypt already has severe difficulty in feeding itself, importing half of its food. But in a world influenced by the *greenhouse effect*, it is anticipated that drier conditions combined with a huge decline in the Nile river flow will cause a consistent drop in the corn and wheat yields. Perhaps even more importantly, global warming will bring on a sea-level rise and the subsequent permanent flooding of prime farmlands. Moreover, in the worst affected area, the Nile Delta, there are phenomena of land sinking as well, which effectively produce a sea-level rise that



may permanently *flood* the Delta plain for many kilometres inland. According to this scenario Egypt would lose 1/7 of its habitable land and much of its main breadbasket. It is realistic to anticipate that the rise in sea-level could eventually displace as many as 15 million people. This prognosis, moreover, is considered by some as cautious and conservative. There might be additional problems such as intrusion of saltwater up the Nile, which will further reduce the irrigated lands that support virtually the whole of Egypt's agriculture.

Southern Europe and the rest of the Mediterranean could be susceptible to such a phenomenon as well. The countries of the Mediterranean basin, mostly countries with fragile economies, in 2000 totalled 442,5 million people, i.e. roughly 269 million in the European side and 173 million in the eastern and southern Mediterranean countries. By the year 2025 the European population is expected to remain more or less the same, but the others are projected to increase considerably. Moreover, by the same year, it is possible that global warming will have extended the Sahara northward until it overtakes the North African shoreline. The eastern Mediterranean countries may likewise be even more *arid* than today. There is good reason to suppose that multitudes of impoverished people will be trying to make their way into Europe. In 1995 there were already 15 million legal migrants in the European Community alone, and at least 5 million illegal, a large percentage of which originated from Mediterranean countries (Myers, 1996).

1.11. WATER VALUING, WATER PRICING, FULL COST RECOVERY AND THEIR CONNECTION



The management of surface and ground water resources is affected to a great extent by a combination of economic and ethical issues. In some societies, for example, *groundwater* is, or has been, linked to land ownership, while in others it is viewed as a 'common heritage' permitting everyone to equal access for at least basic needs. These positions may have been sustained in religious beliefs such as the Shari'a (where the 'right to quench thirst' is a basic principle), in western legal concepts rooted in the early Roman idea of groundwater ownership following land ownership, etc.

In the Arab region, water as such, is in principle a free natural resource that should be made available not only for basic needs but also to farmers so as to guarantee cultivation of agricultural products and to meet the socioeconomic targets of the nation. Therefore, according to this approach, all steps towards 'commercialization and pricing' of water resources may be considered as unethical.

At the same time, rights of access to groundwater have generally been linked to land ownership. Thus, there is often an unclear distinction between the 'private' nature of groundwater rights and the 'public' ownership of rivers, lakes and the resource itself (Puri, S. (ed) et al, 2001).

The various views have been brought to the forefront by the increased recognition of the need for water to be used more efficiently.

In the field of water system management, an intense and on-going discussion has arisen during the last decade, among those advocating a central role for the private sector and those stating that access to water should not be left to market forces but rather must remain a public good, owned and operated by the public sector. This debate was intensified due to a term adopted in the final political declaration of the United Nations World Summit on Sustainable Development (WSSD) held in Johannesburg in August-September 2002, where the text makes reference to “water as a need” or a “basic requirement” instead of “water as a human right”. The opponents of the privatisation model fear that the word “need” strengthens the water privatisation interests, since when it comes to water policy formulation it gives them the leeway to step in and satisfy the need in place of the public sector.

There are two basic concerns: on the one side the necessity to guarantee to everyone a **free access** “to sufficient, affordable, physically accessible, safe and acceptable water for personal and domestic uses”, (United Nations Committee on Economic, Cultural and Social Rights, November 27, 2002) recognized as a *fundamental human right*, and, on the other side, the need to ensure the efficient management of ‘additional water quantities’, precious and scarce, and also of water systems and services that require considerable amounts of capital and investments. It is at this point that questions about the ‘**pricing**’ of water are raised and about how **cost-recovery** can be effectively achieved, what the social objectives against which efficiency is measured (including maintenance of supplies for the poor and the environment), what sections of societies play a role in decision making and what management mechanisms should be used.

The ‘valuing’, and mainly the ‘pricing’, of water touches both economic and political interests, has deep ethical roots and can easily become a point of tension.

In order to approach the issue properly one should have a clear understanding of the various terms used:

Water valuing includes the appreciation of commercial and intrinsic values of water as a whole. “Valuing” could sometimes result in the assessment of the “true value” of water. This can rarely be considered indeed as a ‘true’ value expressed by a figure. It is often confused with the “full cost” of water. The latter includes all costs related to depreciation of investments for infrastructures, water supply, transport and maintenance of networks but it cannot include the value of water itself and definitely it does not touch upon any other values (such as environmental, cultural, etc.).



FRICING

The calculation of the *full cost* does not necessarily mean that it should be recovered in a homogeneous way from all users. The poor could be exempted for a minimum consumption of water, which could be provided to them free of charge or they may be subsidized for their basic needs, etc.

Organisations and bodies encouraging developing countries to privatise water through some form of public-private partnership (PPP - usually private concession or lease) or private sector participation (PSP - private concession, lease or management contract) are questioning the capabilities of the public sector provider to guarantee efficient water undertakings because of lacking resources, corruption and inefficiencies of various kind, including over-staffing, lack of flexibility and adaptability to changing demands. The privatisation of water can take many forms. Sale to the private sector of the complete system is rare (it has only been done in the UK). Most common is the French model, which involves concessions or leases under which the private contractors collect all revenues for a water service, carries the cost of operating and maintaining it and keeps the surplus as a profit. A more restricted form is the 'management contract' whereby the company is paid a fee for managing the undertaking but does not take over the revenues.

Private participation in water and sewerage projects in developing countries has been increasing rapidly in the last two decades. The most ambitious program in water and sanitation in the MENA region has been initiated by Morocco. It included a concession for Casablanca in August 1997 and a second concession for Rabat-Salé in May 1998. Five new concessions are planned for Marrakech, Fez, Tangiers/Tetouan, Settat and Agadir. The World Bank has supported management contracts in Gaza in 1996 (see Box 4) under a performance-based management. Through this private undertaking an improved drinking water supply, as well as wastewater system ameliorations have been reported. Also, in Amman and Hebron/Bethlehem management contracts of this kind were promoted in 1999. Further private sector participation projects are planned for Algiers, Sana'a and the northern area of the West Bank. Lebanon is also moving toward contracting private operators for maintenance.

Box 4: Gaza management contract

A four-year water services management contract for Gaza was awarded in mid-1996 to Lyonnaise des Eaux/Khatib and Alami (LEKA) in order to help local government service providers and the Palestinian Water Authority to improve water services. The contract fee is split between a fixed annual payment and an additional performance payment based on the achievement of performance targets. The contract is not funded by revenue from water and sanitation services but, rather, it is entirely funded by a US \$25 million credit from the World Bank to the Palestine Liberation Organization for the benefit of the Palestinian Authority, because political and security concerns would likely have dissuaded operators from taking on such a large assignment without the support of the Bank. The Bank also contributed to another



crucial aspect of sector improvement, establishing a US \$12 million fund to invest in the operational capacity of water and sanitation infrastructure.

Three years after the award of the contract, the water supply system is much improved. Unaccounted for water dropped from 48% in 1995 to 31% in 1999. Water consumption for the same period was almost 16 million cubic meters, nearly 50% more than in 1995; per capita water consumption rose by 50% and collection rose almost 30fold.

Source: Saghir, J. et al, 2000.

On the other hand, however, there are reasons to believe that the privatisation of water services is not the panacea for all problems affecting the water sector, nor that public sector ownership is in itself a cause of inefficiency or an inferior basis for providing water and sanitation.

The great majority of the population in developed countries, including Europe, the USA and Japan are serviced by water that is supplied by public sector undertakings. Historically, water and sanitation was brought into the public sector over the last century because of the perceived inefficiencies of the private sector, for example in Finland, where the use of private companies was explicitly rejected in 1912.

Box 5: PWU in Debrecen, Hungary

In 1995 the City Council of Debrecen, a city of 220000 people in Hungary, decided to reject privatization proposals from two major multinationals in favour of its own municipal water undertaking, Debreceni Vizmu (Debrecen Waterworks). The company was created in 1995 as a corporate entity, separate from the municipality, with a business plan drawn up by the management with the support of the trade unions. The business plan ensured that there was a “full cost recovery”, including depreciation, without generating unnecessary profits. The cost of financing the necessary investments proved to be much lower under public provision -23 kilometres of pipework had been finished by April 1997, at a cost of Forint 320 million, equal to 40% of the amount that the eventual private candidate would have spent on the same work, partly due to the use of local suppliers of equipment, such as metering instruments and pipes. Employment considerations were internalized in the business plan so that 300 more people were employed compared with the workforce planned by the private undertaking. The financial performance of the company compares favourably with that of privatised water companies in other cities of Hungary.

Source: Hall, D., 2001.

The examples given confirm that simply converting a public sector monopoly into a private one provides no competitive incentives for the utility to operate efficiently, make appropriate investments or respond to consumer demands. Likewise, privatisation *per se* does little to improve sector performance if



governments are unwilling or unable to tackle such underlying problems as over-manning, uneconomic water pricing policies, inefficient water measuring and fees collection systems, financing the provision of public goods and restricting over-intrusive political intervention.

Experiences worldwide, both in developing and developed countries, speak out for a more careful consideration of management options. In fact, several problems have been experienced in privatised water services, such as:

- *lack of competition* (one key argument advanced for any form of privatization is the theoretical benefit of competition) since some of the privatizations have happened without any competitive tendering at all, even between the private sector companies, worsened in cases where contracts for building and construction of new works may be reserved for the construction companies of the same group;
- *higher prices* for water and sanitation due to the demands of the company owners for profits and dividends, which may then be globally redistributed for investment in other company activities and the desire of the public authority for a boost to the authority's finances; the expected reduction of prices through private operation has not been the experience in many countries. In France, for example, where some water is managed by municipalities and some by private companies (or joint venture PPPs), figures show a consistent picture of the private or PPP concessions charging higher prices. Moreover, in some cases faults such as deficiencies in the maintenance, repair, administration and operation of aqueducts and sewers and required financial reports that were either late or not submitted at all have been experienced.
- *concessions related problems* such as the difficulty to cancel long-term concession contracts or build-operate-transfer projects (BOTs: these are projects relating to the construction and operation of specific water or sewerage treatment plants) even if the performance is unsatisfactory. Terminating a water concession can be very difficult both in developing and developed countries. In Valencia, Spain, the local council tried to re-tender the water concession, which was expiring after 99 years with the same company. The company threatened to sue for damages if any competitor was allowed to take over the system.
- *private cross-subsidies for the multinationals* that often utilize water profits to finance other activities of the parent multinationals, which don't have anything to do with the water services.
- *corruption and weak accountability*, favoured in many cases by embryonic regulatory structures, in others by the lack of transparency, while in others by the excessive complexity in their organisational structure. As regulation is supposed to be the



way in which the public interest is represented in private concessions, the lack of public sector capacity is an important reason not to privatise, rather than a justification for public-private sector partnerships. While private operators frequently insist that the contract itself should be a secret document-even from the elected councillors of the authority which have given the contract, and the community involvement component is in most cases not present in water projects, corruption cases of private operators, mainly connected to the award of contracts, have been registered in numerous cases.

The alternative of a public sector water undertaking (PWU) has shown to operate successfully in transition and developing countries, as well as in developed countries. In particular, the following advantages were experienced:

- a good score on efficiency indicators and a better public support
- transparency, accountability and defined managerial autonomy can be built in
- business plans and pricing policies can include a range of cross-subsidies
- PWU can turn around their finances and improve collection of bills

Even in cases of private participation, given the characteristics of the water and sanitation sector, it seems inevitable that some forms of continued public regulation of the private companies will be necessary. Regulation in practice is about creating the conditions under which private firms can operate effectively, providing water of good quality at affordable costs for the poor and in such a way that specific customer and public interests are protected.

WATER



CHALLENGE

CHAPTER II: MEETING THE CHALLENGE

INTRODUCTION

Facing the water crisis in the Mediterranean region requires rapid adoption and implementation of policies and strategic actions in a coherent and systematic way. There is a need for ongoing review and urgent adaptation of existing policies to continually changing social and environmental circumstances and to deal with fundamental concerns such as poverty alleviation, public health, food security, energy generation and protection of aquatic ecosystems. The main objectives of a sustainable water management policy in the region would therefore be to secure and guarantee equal access to safe water for everyone, under the recognition that “access to a minimum quantity of clean water” is a fundamental right, to ensure that water allocation and management underpins economic and social well-being in the region and to ensure environmentally sensitive water allocation. Such a framework for rights, coupled with *local* and *national* measures for improvement and protection of water resources, water conservation, demand management, pollution control as well as reprioritization and reallocation whenever needed, institutionalised through a system of incentives and disincentives, will help address (hopefully proactively) the crisis.

The effective adoption and implementation of these measures can be ensured through a combination of local, regional and/or national regulatory mechanisms enacted to guarantee that water resource development plans of the region do not threaten ecosystems, secure access to water in order to meet basic needs of today and of the future generations and are open to public scrutiny.

2.1. DEMAND MANAGEMENT

“Water demand is increasing three times as fast as the population growth rate even though no new water can be created anywhere on this planet. However, in many countries, water shortages stem from inefficient use, the effective loss of available water too polluted for use by humans or nature or by the unsustainable use of underground water in *aquifers*, which can take thousands of years to replace”. This statement of Dr. Abu-Zeid, Egypt’s Minister of Water Resources and Irrigation and President of the World Water Council is clearly applicable to most Mediterranean countries and supports the idea that, although increases in water availability in the Mediterranean region are expected to come from a combination of *water demand* and *water supply* options, the most effective set of solutions in the long term will be the ones promoting demand management, i.e. delaying having to turn to new supply sources -generally more costly and limited.

Water demand management is mainly about achieving a *reduction in the use of water resources*, normally through increased efficiency of *water supply*,



conservation, *recycling* and *reuse* of water. It aims directly to change human practices and behaviours, probably the greatest challenge since most water users believe they have a right to use (and waste) water freely, without considering the impacts of wasteful water use on society and the environment.

The approaches used in water demand management might be organised around two axes:

On the *first axis*, there could be measures to ensure that the use of water in some sectors or spheres is reduced through *conservation measures*, including both increases in efficiency of existing uses and changing use patterns. For example, while water consumption for household use in some countries of North Africa and the Middle East average to 50-70 litres per person per day, the average water use of a resident of the North Mediterranean region is about 220 litres per person per day. On the other hand, an average person in the Netherlands uses only 120 litres per day for the same tasks. This demonstrates that there is a significant potential to reduce consumption at household level, especially in water guzzling societies.

Another area where *demand management* can be applied for saving water substantially is in agriculture. For example, even in water scarce countries or regions, many national and regional policies encourage shifting away from traditional crops (tested and proven to have *drought* resistance) to thirsty cash crops like cotton, sugar beet and floriculture. Moreover, centralised water provision to large-scale agriculture is often subsidized encouraging indiscriminate use.

"The task is to 'reinvent irrigation for the 21st century', grounding this process in an appreciation of both the benefits and costs of irrigation systems to date, and the development, dissemination and working through of new options revealed by research, by comparison of global experience" as stated by the GWP Chairman, Mrs. Margaret Catley-Carlson, (GWP, The Stockholm Water Symposium 2001).

At the level of *water use efficiency*, improvements, especially in abstraction, treatment, bulk transfers, local distribution, consumer meters, revenue collection, appropriate economic analysis and accounting procedures, can be achieved through leakage and pressure reduction, distributional zonal metering and universal metering. Dual supply systems of different water quality for different uses can be a cost effective option.

In irrigated agriculture where there are often heavy water losses before the water reaches users (up to 50%) there is much scope for improvement.

Important measures would be those aimed at improving existing infrastructures, such as lining main irrigation channels, placing localised irrigation systems, levelling of plots, improvement of drainage, etc. as well as other measures not



Demand

related to infrastructure aspects, such as improvement of management and organisation of irrigation, improvement in knowledge about appropriate water quotas for different crops and about water losses and returns, tariff systems (better volumetric than per hectare to increase efficiency in water use), etc.

Efficiency in water use in irrigation depends upon the processes of abstraction, distribution and application and is normally expressed as the product of these three. *Drip irrigation* often means a reduction of the water abstracted.

In areas where irrigation consumes 60% of the total resources with an efficiency rate around 60% (which is often the case in the Mediterranean countries), an increase of 10% of the irrigation efficiency would render water available for other purposes.

Most water used in urban areas is for domestic purposes. The use of water saving devices in homes can help reduce consumption in urban areas. This information is often not available. There is potential for reduction between 50% and 80% of water use in toilet and washing. The introduction of limiting devices in showers can reduce water use from 10% to 40%. Introducing water meters for individual households can also lead to reduction in *water demand*.

In the countries of the Levant (East Mediterranean), water conservation is expected to bring immediate and measurable water savings. If irrigation efficiency alone is improved by 10% the savings would amount to about 1.7 billion (10⁹) cubic meters a year which is substantially more than the total water use of Jordan and the West Bank combined. Many areas in the Balkans suffer from intermittent *water supply*, in spite of their abundant water resources. In some cities the situation is so critical that, even though almost all urban households are equipped with running water, shortages are frequent.

In addition, water losses in the cities of the northern Mediterranean are high and range from 20% to 70%.

In some islands water supply systems show around 50% of the water unaccounted for, out of which 35% are losses and the other 15% is the difference in water meter measuring or water consumed without being recorded. The unaccounted water can be reduced up to 15%.

The *second axis* on which a demand management approach in the water sector could be organised regards measures ensuring **minimization of pollution** (which places a great burden on water as a pollutant carrier), so as to create a greater availability of clean *freshwater*. Under a "conventional Mediterranean scenario" (Margat, J. and D. Vallee, 2000) water pollution will be only partially controlled and will decrease in the North more than in the East or South Mediterranean. In this context it is important that incentives and disincentives are in place at every level



to ensure that the water returned to the ecosystem is of such quality that the regenerative capacity of the ecosystem is not affected.

One of the major challenges for introducing *water demand management* is the creation of an institutional and legal framework (still missing in many Mediterranean countries) requiring the adoption of these practices and the promotion of law enforcement and implementation through constant monitoring.

Improved water use efficiency is also tightly related to the setting up of mechanisms for changing peoples' attitudes and behaviour towards water use, such as education and communication, including programmes to work with users in schools, at community and institutional level; economic incentives including tariffs and charges for water use (domestic, industrial, agricultural) and for provision of environmental services; subsidies or rebates for more efficient water use, etc.

Moreover, there is a great necessity to improve, through *capacity building*, the technical experience needed to carry out these measures. This is a much more efficient process since by comparison the equivalent water supply measures are more complex and often more expensive to implement.

2.2. WATER SUPPLY OPTION

Water demand growth will be more limited in countries of the northern Mediterranean, since most of these countries (with the exception of Turkey and Albania) will exhibit slow, or even negative, population growth. Most areas of southern Mediterranean and some in the northern parts of the region (particularly eastern Spain and southern Italy) are likely to face *water scarcity* problems especially in large urban areas and coastal and tourist settlements. Even though *water demand management* has an important potential and would need to have priority, some *water supply* programs would also need to be implemented.

However, with increasingly limited and costly (in economic and environmental terms) water supply options, the strategy of increasing water supply will have to use sophisticated methods aimed at addressing the needs of the final consumer, without further increasing the pressure on existing water sources. This means a particular emphasis on optimising the exploitation of existing water resources.

No single action, however, can remedy the water shortages in the countries of the region. Rather an integrated approach is needed to ensure water availability, suitability and sustainability.

Community-based water management can be a practical and in some cases better alternative to the large-scale, centralized, capital intensive approaches that have



dominated in the past. Local strategies can also serve invaluablely as complementary to wider-reaching water management approaches. They permit a democratic decentralization of decision-making and accountability, whereby people (particularly the poor and otherwise disadvantaged) are empowered to take part in the decisions that define their own futures and encourage the integration of traditional knowledge with innovative science to promote fair and efficient supply management.

Water supply options in this sense might include:

Water supply efficiency measures: at this level rainwater harvesting, particularly useful where *rainfall* is seasonally high, consists in the collection and storage of rainwater in the soil profile, in tanks, in ponds and cisterns providing water for irrigation or domestic purposes. Rooftop and field water harvesting, are two of the options practiced already for centuries in the most *arid* and *semi-arid* zones of the Mediterranean. Rich varieties of technologies and materials have been used over the millennia. For example, depending on local custom and materials, roofs may be sloped or flat, solid or thatched, while field water harvesting technologies include simple dikes, ditches, embankments as well as sophisticated tunnel systems like the “qanats”, used in Syria and elsewhere to carry water over many kilometres from mountain sources to the farmlands and cities.

Too often, and for diverse reasons, traditional methods of harvesting field water have fallen into disuse or have failed to match new and growing demands. It is a challenge to understand if these more or less conventional water-harvesting techniques can be applied in unconventional places or in communities that are unfamiliar with them. Another challenge is to explore the possibilities of old methods being scaled up to cover much bigger areas, with the help of new technologies, e.g. satellite-aided mapping and complex mathematical models for slope and soil analysis, crop selection and rainfall tracking.

Optimisation of existing water resources: this option is mainly the development and use of *surface water* based on *supply enhancing measures*, including surface and subsurface storage and the *protection of surface water supply* both from *evaporation* and seepage, on the one hand, and from pollution on the other.

Combined soil and water *conservation measures* are used in some areas. With the changes in cultivation methods, the use of heavy machinery and the movement of population, the mountainous regions have been depopulated and the traditional terraced cultivations of the Mediterranean have been abandoned. In the islands of the Mediterranean, for example, which have steep soil slopes and short riverbeds, water *runoff* has a very short travelling time, with most of the *flood* flow being discharged rapidly into the sea. Floodwater flow could be delayed so as to achieve increased percolation of surface water, as well as *groundwater* recharge. At the



Conservation

same time such measures ensure soil conservation, soil water recharge (*aquifers*) and surface water impoundment. These are multi-purpose measures, contributing towards soil and water conservation as well as ecological sustainability.

Use of lower quality water for uses other than drinking: for example the use of *groundwater* from urban and other areas, that is often unsuitable for drinking, can be used for other purposes, such as toilet flushing or gardening. This water is usually found in shallow depths and could cause major disruptions during floods. However, it is a considerable resource, usually recharged by rainwater, return water from irrigation and by losses of the *water supply* and *sewage* systems. Promotion and implementation of measures for the use of lower quality water found in *aquifers* in the inhabited areas and which cannot be used for drinking purposes can save for each dwelling up to 30% of its water consumption, thus considerably reducing the demand on freshwater resources.

Treatment, recycling and re-use of *domestic grey water* within the house perimeter and installation of water storage facilities on the roofs of houses (water harvesting): these are measures that are being developed in Malta.

Recycling and *re-use* are useful planning and management tools at the *river basin* level. Urban effluent can be treated and returned to *aquifers* or rivers for dilution by natural flows and re-abstraction downstream (although it is important to ensure that the quality of returning effluent is good enough in order not to impose ecological or health risks). Treated effluent from industrial or municipal treatment plants may be piped directly for use in agriculture and horticulture (although the level of treatment should be adequate to minimise health risks and treated recycled sewage only used for crops with low uptake of metals or microbes from water). Irrigation return water from drainage canals can be reused if mixed with fresh water. Water returned to rivers or used for groundwater recharge should be controlled in both quality and quantity by discharge permits or other regulatory tools, which take into account the needs of the aquatic environment.

In areas where water is insufficient to cover domestic *water demand* and other vital needs, the *desalination of marine or brackish water* could be considered. Promotion of this approach is based on the relative costs of this "*non-conventional method of water supply*".

Although desalination technology has been developed to a point that it can provide a reliable source of water, the cost of desalinated water is still relatively high and the process is a high energy demanding one (the energy consumption for seawater desalting using reverse osmosis with energy recovery can be established in the range of 2,5 -3,0 kWh/m³. If we include seawater intake, pre-treatment and freshwater pumping, the figure will increase to 4,0-4,5 kWh/m³), usually based on non-renewable energy resources that often need to be



imported. The price of fuel and its fluctuation plays a decisive role on the cost and the feasibility of using desalinated water as a general strategy. In addition, the use of fossil fuels increases carbon dioxide emission into the atmosphere polluting it and contributing to the green house effect.

This approach has been used in most large Mediterranean islands, Cyprus, Malta, Majorca, Sicily and a few smaller Greek islands. In Malta, the *desalination* plants provide water for half of the total annual consumption. In Cyprus the contribution is actually 5% with plans to be increased to provide 15% of total water supply in the next years. In Majorca desalinated water provides 5% of total annual consumption.

Brackish water can be used after desalination or directly in irrigated agriculture where it can be mixed with *freshwater* to achieve specific salinity levels appropriate for certain crop types. Also, certain industries can utilise brackish water effectively. Estimates of stored volumes of brackish groundwater for major *aquifers* suggest immense resources, but not all of these quantities are suitable for utilization. Constraints to the development of *brackish water* resources in the region include lack of reliable data regarding cost and economic feasibility, technology transfer, training, capital and operation and maintenance costs.

Currently, laws and regulations for the extraction, treatment and management of brackish water are absent. There is also no established policy for the distribution of the produced *freshwater* as well as the disposal of the resulting brine.

Water transportation is also a non-conventional *water supply* method considered in serious and emergency water shortage cases. This solution was applied in Majorca for 3 years, where water was transported in tankers from the mainland to meet domestic demands that could not be met due to *drought*. This solution was also applied in Sicily. Water transportation can be made on a permanent basis by transporting water from areas with excess water to areas with *water scarcity*, for example from the mainland or from another country, as occurs now in the islands of the Adriatic Sea.



Resources

2.3. WATER RESOURCES ASSESSMENT AND INFORMATION MANAGEMENT

A major barrier preventing a sustainable management of available water resources is the lack of information. Most countries with severe water depletion problems have only a limited or non-existent information base on available resources, their quality, withdrawal ratios and other variables in a format useful for resource planning. Especially water quality is often very poorly monitored and weakly presented in knowledge bases, putting such sectors as environment and health at a disadvantage in situations where basic knowledge is required.

Water resources assessment refers to a set of actions necessary to get a holistic view of the water resources, both surface- and *groundwater*, in a given country or region related to its use by society.

Information management is the process through which data and information are converted into knowledge, which is fed into decision support systems, assisting management and decision makers in addressing priority issues in a user-friendly and accessible manner. It is fundamental to the correct utilization and crossing-over of information sometimes of very different nature in order to make a good use of it.

Information management systems refer to the range of available electronic systems that arrange, store and exchange data and information. These electronic systems replace more traditional printed catalogues. Of particular importance for water management issues are bibliographic information (and accumulated, historic knowledge) systems and geographic information systems

The basic steps to understanding resources and needs are the following:

- *collecting and storing data* on the hydrological cycle (quantity and quality) and accessing physical, demographic, socio-economic and water use data in a cross-sectoral perspective and setting up systems for routine data assembly and water monitoring on a regular basis.

Water resource knowledge bases of this kind need to be built up considering the associated priority issues that have to be dealt with, such as human health, ecosystems health, land use impacts and forest cover, sectoral competition for water, vulnerability to *floods* and *droughts*.

GIS applications and spatial/temporal databases linked to hydrological simulation models can manage vast amounts of information in a user-friendly and accessible manner:

- *complementing information* about the basic resource needs with data from the demand side reflecting, for example, income distribution and willingness to pay, in order to be able to plan the use of the resource and to identify the financial resources available for water resource management. Good information management enables accurate predictions of future (sectoral) water needs so that these can be used to re-allocate water wherever there is a predicted shortfall.
- *undertaking systematic and scientific research* on the occurrence, use and ways of augmenting and managing the resource (allocation efficiency measures, demand and/or supply alternatives, etc.).
- *collecting and analysing best practice cases* that could be successfully applied to the specific socio-economic, demographic and environmental situation.
- *encouraging data and information sharing* both at national and international levels so that the maximum of results and experience transfer can be achieved with the least efforts (especially in terms of time and money).



Risk

2.4. RISK MANAGEMENT

Plans need to be conceived in order to combat and mitigate extreme events such as *droughts* and *floods*. Short-term solutions, for the prevention of damages from floods, as well as the basis for preparation of long-term plans to reduce negative effects of droughts have to be provided. The latter is getting more and more important since droughts are likely to spread and increase in the coming years.

The strategy could result in the reduction of damages from floods and, if possible, in the use of flood flows for *aquifer* recharge or storage, in increased *water supply* security in the case of implementation of drought mitigation plans, improved food security and reduced pressure on water resources. The types of actions necessary for being prepared to deal with natural disasters in the region include: collecting data and information to prepare indicators that help forecast floods and droughts, construction of protective structures and creation of strategic resources, interconnection of supply systems and use of non-conventional resources, adoption of economic instruments and emergency regulations, physical planning to avoid occupation of flood prone lands, preparation of comprehensive flood and drought management plans.

Hydrodiplomacy

2.5. CONFLICT RESOLUTION AND “HYDRODIPLOMACY”

Co-operation between *riparian* countries of shared international waters is important in order to reduce the potential for conflicts among these countries. While national and customary laws exist to deal with conflicts at the local and national levels and many countries are signatories of international conventions (see for example the 1992 Helsinki Convention on the Protection and use of Transboundary Watercourses, which entered into force on October 6, 1996 and open to member countries of the UNECE and other European States having a consultative status with the UNECE), existing international laws may not always fully address conflicts among riparian countries. Currently there is no agency for the management of transboundary water resources. Several UN agencies, including FAO, UNDP, UNEP, UNESCO, UNIDO and WHO, incorporate water related issues in their charter, as does the World Bank. Also established recently is the World Water Council, a “think tank” for world water resources issues working in parallel to the Global Water Partnership. However, none of these institutions incorporates mechanisms for the resolution of eventual transboundary disputes over water resources within its mandate.

Generalized legal principles for the management of transboundary waters are currently defined by the Convention on the Non-Navigational Uses of International Watercourses, ratified by the UN General Assembly in 1997. It took 27 years to develop the Convention, highlighting the difficulty of combining legal and hydrological issues. Although it provides many important principles, including responsibility for cooperation and joint management, as well as few practical guidelines for water allocations -the central issue in most water conflicts- the Convention has been criticized for being vague and occasionally contradictory.



The success of countries in the implementation of proposed strategies for water sharing will very much depend on political will, collaboration on sharing information, technologies, best practices and knowledge, leading to joint planning and eventual joint management of shared resources. Once institutions -for example *watershed commissions*- are established or strengthened, existing legal approaches (necessary for conduct and enforcement) can be supplemented by flexible mechanisms such as:

- “Second track” diplomacy (*environmental diplomacy* or ‘*hydrodiplomacy*’)
- *Alternative Dispute Resolution (ADR)* through international bodies or in the spirit of Agenda 21
- Technical/professional or independent panels of experts or what have been called “*epistemic communities*”
- Public awareness, participation and mobilization

Conflict management tools, utilised to anticipate, prevent and react to conflicts and selected depending on the root causes of the conflict, as well as its type and location, can be classified into three main types.

Interventions for conflict management are based on the resort to a neutral and ‘impartial’ individual or party participating and guiding the process towards reaching an agreement and they include *facilitation* (used in situations with multiple parties, issues and stakeholders and where issues are unclear), *mediation* (interest-based negotiation process, used when there is some relationship among parties), *fact-finding* approaches (used to clarify and make recommendations regarding differences over data or substantive disagreements using recognised outside experts) and *arbitration* (arguments are submitted to an arbiter who acts as a judge).

Decision support/modelling tools permit the production of a simulation tool, used in a visual way, permitting a clearer evaluation of existing scenarios.

Tools for consensus building such as *joint training*, *policy dialogue*, *strategic conflict assessment* and *interest-based negotiation* are applied in situations of low to medium conflict and tension.

The agreements which have emerged from efforts of “hydrodiplomacy” reflect, in great part, the desire of the signatories to engage in comprehensive national planning, basin-wide management, multi-purpose development and water quality control. They constitute first tangible evidence of an increasing concern with the need to craft flexible but durable regimes capable of enhancing the protection of the ecosystem and a desire to serve the interests of all parties involved by reducing uncertainty, stabilizing expectations and promoting therefore a more ‘standardized’ conflict resolution or conflict management.

Israel-Jordan Peace Treaty

Communication between the two states has taken place since the creation of each, ameliorating conflict and facilitating conflict resolution on a variety of subjects, including water. The so-called Picnic Table Talks on allocations of the Yarmuk have taken place since the 1950s and negotiations to formulate principles for water-sharing projects and allocations have occurred in conjunction with, and parallel to, both bilateral and multilateral peace negotiations. These principles were formalized on 26 October 1994, when Israel and Jordan signed a peace treaty, ending more than four decades of a legal state of war. With the peace treaty, territorial modifications made occasionally by Israel in the past were reversed and sovereignty of the land was returned to Jordan, although Israel still retains rights to use the water from the wells present in those territories.

For the first time since these states came into being, the Israel-Jordan peace treaty legally spells out mutually recognized water allocations. Acknowledging that, “water issues along their entire boundary must be dealt with in their totality” the treaty spells out allocations for the Yarmuk and Jordan rivers, as well as Arava/Araba *groundwater* and calls for joint efforts to prevent water pollution. In addition, “recognizing that their water resources are not sufficient to meet their needs” the treaty calls for ways of alleviating the water shortage through cooperative projects, both regional and international. The Interim Agreements between Israel and the Palestinians (1993 and 1995) signed on the wake of the multilateral activities started in Moscow in January 1992, also recognize the water rights of both Israelis and Palestinians, but defers their quantification until the final round of negotiations.

Source: International Development Research Centre, “Trends in Transboundary Water Resources: Lessons for Cooperative Projects in the Middle East” (2000)

Nile River Basin

The political will to achieve a basin-wide agreement and framework for long-term cooperation on the part of the ten Nile Basin *riparian* states is gathering pace. In 1992 representatives of all ten states agreed upon a Nile River Basin Action Plan with the tasks of developing a cooperative scheme for the management of the Nile. In 1995 the World Bank, together with UNDP and the Canadian International Development Agency, accepted the request from the Nile riparian states to give impetus to the project. In 1999 the Nile Basin Initiative was launched, with the membership of all basin States. The International community has facilitated an ongoing dialogue between the riparians of the Nile basin to a process of dialogue and joint planning.

The initiative is developing an agreed basin-wide framework and is based on the countries’ shared vision to ‘achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile Basin water resources’.

Sources: Green Cross International, 2000.

GWP, 2003, Water for the 21st Century: Vision to Action, Framework for Action for North Africa (FFA).

2.6. INSTITUTIONAL SCENE AND RELEVANT MEASURES IN THE MEDITERRANEAN

In the Mediterranean the transition from a *water supply* expansion phase, where water resources development was the major focus, to a *water demand management* paradigm, focusing on the effective and efficient use of water resources will require major transformations.

One of the major challenges consists in the improvement of the institutional and legal framework. In fact, while there is often no specific legislation requiring the adoption of water demand management practices, enforcement and application of existing laws are in many cases deficient and need therefore to be improved.

The organisational structure of the *water supply* and main water policy agency is centralised in most of the Mediterranean countries. Virtually all management and planning functions relating to water development and production are controlled by the central government where the agriculture sector often plays the most important role in water scarce countries. The close political association of water and agriculture means that intersectoral conflicts tend either to be ignored or to be resolved, in most cases, in favour of farmers. It also means that internal water institutions resist suggestions to charge for water or adjust prices for farmers or, in general, to move towards establishing rational water allocation mechanisms. Yet in many cases decision making and responsibilities are fragmented and overlap among different parties and levels of government.

Apart from the central government, the main actors are the local governments, the water users associations, the state-owned enterprises and some governmental agencies, which are mainly responsible for water distribution.

Today in many Mediterranean countries water organisations are experiencing rapid and fundamental institutional and structural changes, reflecting national needs for greater efficiency and improved performance.

Particularly important would be to undertake actions in order to improve coordination between different organisations at policy, planning and operations levels so that integrated water resources management could be incorporated and reflected more efficiently in national water strategies as well as in other sectoral policies.

In order to ensure effective adoption of measures promoting water conservation, augmentation, demand management, pollution control as well as reprioritization and reallocation issues, there is the need to continue the current trend of institutional restructuring together with the improvement of the regulatory role of the public sector, supported by adequate, simple and efficient legislation, effective law enforcement and strong human resource development.



In particular, the institutional framework should be able to support and ensure the following:

- To incorporate at a national policy level a set of targets for leakage and water loss reductions and for improvement of efficiency in water distribution networks and in water use in urban areas and irrigation, establishing water use quotas per hectare and per type of crop in different irrigation areas. Important would also be the establishment of objectives and of a programme of water savings at a basin level, fixing targets and monitoring its implementation.
- To introduce and enforce legislation requiring metering in urban and agricultural uses and incorporate in the urban planning laws requirements for suitability of sites in relation to availability of water resources and potential pollution.
- To devise a system of incentives and disincentives and to institutionalize these through regulatory mechanisms.
- To improve awareness at the highest levels of Government about the benefits associated with sustainable water management measures but also at the level of public and consumer categories in partnership with NGOs, local authorities, educators, mass media, etc.
- To facilitate access to information on water issues, improving in parallel those information services targeting users categories such as farmers and industries regarding water saving technologies, advice on water application and management and on crop varieties and markets to ensure water savings, recycling mechanisms and the adoption of 'drier' production processes.
- To improve research, capacity building, exchange of experience and dissemination of existing good practices on water demand management in the region.

At the EU level, Community action in the field of water policy is represented by Directive 2000/60/EC, the **EU Water Framework Directive** (or even shorter the **WFD**), adopted under joint decision by the European Parliament and the Council of Europe. The implementation of this Directive, upon its transposition into national legislations, its enforcement and application, is going to influence considerably the state of water resources management in the EU Mediterranean countries towards more sustainable patterns. Such an integrated policy approach to water resources, differing substantially from passed policies where protection of good water quality issues and water resources management were considered separately, could be adopted as a good practice policy model also for the non EU Mediterranean countries where legislation and policies are still too sectorial and fragmented.

Instruments

2.7. REGULATORY INSTRUMENTS

Regulatory instruments are one of the most important means for implementing policies and plans. They require, allow, forbid or restrict specific activities or prescribe specific objectives and targets to be reached. Applicability and enforcement capacity, which are directly linked to administrative infrastructures and institutional background, are critical for regulations together with their economic feasibility and acceptability by the public. Where standards are set very stringently the costs involved in achieving them may be disproportionately high and non-compliance becomes the norm, a fact that undermines the effectiveness of regulations.

Regulatory instruments in the water sector can and should be directed to achieve the following:

- **water quality control**, including the control of effluent disposal discharges at point and non-point sources of pollution through the *compliance to a set of emission or discharge standards*. Specific regulatory instruments can also be used for the protection of aquatic ecosystems and *riparian* habitats and for the rehabilitation of water resources. Where discharge standards are difficult to apply, as in the case of non point source pollution, regulations can focus on the techniques or practices. In agriculture, for example, the best environmental practice approach, providing guidelines for application of fertilisers and pesticides is often used. Regulatory instruments can be developed for the protection of *groundwater*, taking into account the difficulties of monitoring and rehabilitating it. Other types of regulatory instruments include product standards, which can be set for some pollutants, such as pesticides, land use controls, which may influence the setting of ambient or discharge standards and safety regulations and procedures for accidental pollution.
- **water quantity control**, through permits for ground and surface water abstraction. The quantities permitted may reflect seasonal needs. Usually, general rules determine when a permit is needed and when not, for example, for which volume of abstractions. General rules may forbid or limit abstractions for specific waters or under such specific conditions as periods of severe drought. Control of water quantity and quality are closely linked. For instance, some domestic or industrial water use can result in polluted return flows that reduce the suitability for downstream uses.
- **regulation of water services**, by means of *general standards*, normally set for all aspects of water service delivery, such as drinking water quality, *water supply* security, connection to sewers or alternatives such as individual treatment systems, maintenance of the water services infrastructure, discharges to sewers and *sewage* treatment (which requires different quality standards for the effluent). The regulation of water services should be separated from the provision of services to prevent conflicts of interest. In fact, where a single body is responsible for setting discharge standards, enforcing their application and with the delivery of services, which involve discharge of treated effluent, there is a conflict of interest between the regulatory and the service functions.



Preconditions for the success of all these types of regulations are the realistic and complete view on the present situation, for the setting of ambitious but achievable goals, a timetable for progressive improvements and sufficient institutional capacity for compliance, monitoring and enforcement. The need for institutional capacity should get attention in the water resources assessment as well as in policy and planning stages.

Economic

2.8. ECONOMIC INSTRUMENTS

Economic barriers represent one of the major challenges towards the introduction and implementation of *water demand management*. This is partly due to the type of investments required in the water sector and the sources of funding. It is also closely linked to the fact that in most Mediterranean countries water prices are extremely low and do not encourage water saving. Economic instruments can complement the use of institutional, regulatory, technical and other kinds of tools used in the water sector. They generally involve the use of prices and other market-based measures to provide incentives to consumers and all water users to use water carefully, efficiently and safely. Economic instruments may offer some advantages over other tools, such as providing incentives to change behaviour and raising revenue to help finance necessary adjustments. For successful application economic instruments need appropriate standards (e.g. for discharges or *surface water quality*), effective administrative monitoring and enforcement capabilities as well as institutional coordination and economic stability.

Water pricing is an increasingly common tool, applied to recover costs, to give the right incentives to users and to protect the environment. There is a great variety in the type, level and structure of tariff systems observed both between and within countries. In some Mediterranean countries water is provided free of charge, while in several cases fixed charges are still applied.

Volumetric tariffs, which charge according to the amount consumed, are more versatile than fixed charges and can provide incentive for careful use. Cost recovery charges for sanitation services are often levied on households and/or industry, typically as a surcharge on the water tariff.

Tariffing system based on the real cost of drinking water has been introduced, after the privatization process, in most of the countries of the north Mediterranean sub-region and has produced positive results. Effectiveness of this incentive could be improved through its link to other incentives such as increasing unit charges when consumption increases (Athens, Barcelona, Malta, etc.), improving the fees-charges collection (Turkey), subsidizing poorer population when the cost of water is set equally for all consumers, etc.



Real cost pricing for irrigation, often heavily subsidised, is a politically sensitive issue because it touches upon social and political problems of large parts of rural populations. It is rarely used in the region, although it might be needed in order to give signals for water saving. It is expected that these measures, if introduced carefully, could help re-allocating water resources in a more rational way and contribute to increasing *water supply* where it is needed, improving also the cost recovery.

Charges could provide useful incentives to polluters to reduce their pollution discharges while *revenues* would allow generation of financial resources for financing pollution abatement programmes. They are designed to reflect the financial and economic costs of discharging wastes into the environment. By levying a charge, polluters are encouraged to *reduce their polluting discharges* and, in effect, are paying for the reduction of the ambient water quality they cause. Charges can be levied on specified pollutant discharges on the bases of load and/or concentration and can reflect environmental damages imposed by pollutants.

As with regulations, pollution charges need effective regulatory and management capacity.

The introduction of *tradable discharge permits*, an innovative measure, could help improving pollution prevention and control: the “right to pollute” within limits, within a total permitted load set by environmental regulators can be traded among firms, leading to abatement being achieved in the least expensive manner. In fact, the idea is not that the polluter pays less but to achieve more with the same cost. This measure is limited to countries with developed pollution monitoring systems and could be costly to administer.

Taxes and/or subsidies need to be applied in a selective way to reflect environmental considerations or other specific policy aims. Subsidies can be used to protect vulnerable and poor groups in society. However, subsidies often encourage excessive consumption of water, either when its use is directly subsidised or where the prices of goods and services that consume water are subsidised or affect its use. For example industrial plants that are heavy water users, operating in a protected, subsidised regime, lack any incentive to conserve water or use it efficiently; low prices in the power/energy sector also encourage excessive use of water while subsidised prices for “thirsty” farm crops cause a heavy use of irrigation water. On the other hand, subsidies could be applied to water-efficient appliances and more generally to encourage changes in behaviour while taxes could be applied for discouraging unsustainable performances.



Research

2.9. CAPACITY BUILDING AND RESEARCH

The training of water professionals in all aspects of water management is fundamental for the effective and sustainable management of this precious resource. Actions should include training in integrated water resources management planning, water demand management, economic aspects of water management, agricultural water management, use and application of GIS and remote sensing in the sector, use of decision support systems, enforcement of water standards, effluent standards and regulations. Local and regional training capacity should be built, for example through the provision of support to national institutes that could provide training for local and national experts, while training of water systems users should be promoted as well.

The promotion of research and the creation of new knowledge would also be essential.

Research in relation to agriculture, for example, should emphasise on the impacts of agriculture modernisation on soil quality and the ability of soil to retain water and nutrients. Pilot projects and demonstration projects at regional level could show the impact of existing irrigation practices on soil quality and the need to recuperate some traditional sustainable forms of agriculture present in the region. Research could also focus on *water stress* and salt resistant crops and on water technology related to water efficiency and improved water application and management.

Research on the health of aquatic ecosystems is also fundamental, as well as the promotion of pilot and joint regional projects on this matter. Improved knowledge is needed on the impacts of water abstraction and pollution on *freshwater* ecosystems, including *wetlands* and the appropriate management systems to make social and economic use of water compatible with the maintenance of aquatic ecosystems.

Research efforts should also be employed in introducing new methodologies and technologies of “in situ” rapid and accurate detection and measurement of pollution, as well as innovative research programmes for areas and issues of which little is known, or on new sophisticated concepts of water management such as “*virtual water*”, “*green*” vs. “*blue*” water cycles, etc.

2.10. SOCIAL CHANGE TOWARDS A SUSTAINABLE WATER RESOURCES MANAGEMENT

Changing water practices requires changes of deeply held attitudes in individuals, institutions, professionals and social organisations within civil society. Several policy tools such as regulation, pricing, investments, institution building, etc. can help influencing water use. However, without changes in the way consumers use water, safe, wise and ecologically sustainable water resources management is



impossible. The creation of shared visions, through joint diagnosis, joint creation of options, joint implementation and joint monitoring is probably the key to encouraging civil society to a sustainable water management. This itself requires broad but also “informed” stakeholder participation in water planning and operating decisions that can be promoted through the adoption of social change instruments emerging from participatory experiences and offering people the chance both to claim rights and also to take on the consequent responsibilities. Therefore, participation needs to be supported by people with well-informed attitudes who can respond to the need for changing patterns of water management. Hence, access and availability of information, education, training and awareness raising are all important tools for social change.

The significance of these tools has been specifically recognized in the Rio UNCED (1992) and Agenda 21, as well as by international bodies which focus on Mediterranean issues, such as the Mediterranean Commission for Sustainable Development (MCSD), which has included as a major theme among its medium term priorities, public information, awareness, environmental education and participation.

Information and Public Participation

Availability and access to information is often seen as one of the keys for empowering people and leading to successful public participation in the promotion of sustainability issues.

Although steady transformations can be registered in most Mediterranean countries towards a more open spirit gradually favouring public participation in reaching more creative and innovative solutions, several obstacles still inhibit these evolutions. Some of them have been described above, e.g. the lacking or inadequate legal and institutional framework, inadequate administrative infrastructures coupled with limited resources to cope technically with the requests by the public, the scarce coordination among the various administrative sectors and public agencies, etc. Further obstacles are the fragmentation of NGOs and civil society initiatives and weak structures, particularly at national level, where most of the critical environmental decisions are made, and the general reluctance of the authorities to provide timely and useful information to the public even when this is technically and legally feasible. The latter is due to the lack of acceptance by many authorities and the majority of civil servants that the civil society groups and NGOs as legitimate “partners”. This last obstacle has a deep cultural root, sometimes difficult to overcome even if the “institutional” obstacle is overcome. In this case “information” and “awareness” efforts should be directed primarily to the responsible administrators and politicians.

There are still relatively few specific binding international provisions for access to information and public participation in decision-making concerning plans, projects, programmes and policies related to environment and development.

Information

In the EU Mediterranean countries the main instrument for providing greater access to information held by public (and quasi-public authorities) is Directive 90/313/EEC on the freedom of access to environmental information, effective since 1 January 1993. Although the implementation of this Directive has encountered several problems, mainly due to structural insufficiencies and delays in setting the necessary structures able to provide the foreseen services, it is viewed as one of the most important instruments for an effective environmental policy and it has initiated a process of change in general attitudes and behaviour on the part of public authorities. The most recent proposal to improve the Directive is the Proposal for a "Directive of the European Parliament and of the Council on Public Access to Environmental Information" (COM (2000) 402), which will not just improve but repeal the 90/313 Directive.

Another instrument aiming to support participatory democracy, civil society, including NGOs, and citizen's rights is the "*Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters*" signed in Aarhus, Denmark, on the 25th of June 1998 and entered into force on 1 October 2001. The main objective of the Aarhus Convention is to contribute to the protection of the right of every person of present and future generations to live in an environment adequate for his or her health and well-being. Although this UNECE Convention was originally opened to member countries of the UNECE and other European states with a consultative status with the UNECE, it could be signed officially by any other state. In many occasions the Mediterranean Ministers have discussed the signature and eventual ratification of the Aarhus Convention by non-European Mediterranean countries which are not UNECE Members.



Among the North Mediterranean countries that have signed the Convention figure the EU Member countries as well as Albania, Croatia, Cyprus and Malta. Its *ratification* however, is still pending in Portugal, Spain, Greece, Croatia and Cyprus. The best possible scenario would be the one in which all Mediterranean countries would come to the same high level of participatory standards, which are reflected at the moment in this Convention. It is therefore recommended that all Mediterranean countries become signatory parties to the Aarhus Convention and implement its provisions.

The involvement of citizens and communities in water management issues is also required by the relevant provisions of the *EU Water Framework Directive (WFD)* which stresses the role of the public and public participation in the achievement of sustainable development objectives. The reasoning behind this is twofold. Firstly, the decisions on the most appropriate measures used to achieve the objectives in a given *river basin* management plan will involve balancing the interests of various groups and therefore it is essential that the process is open to the scrutiny of those who will be affected. Secondly, there is the issue of

enforceability. The greater the transparency in the establishment of objectives, the imposition of measures and the reporting of standards, the greater the care Member States will take to implement the legislation in good faith and the greater the power of the citizens to influence the direction of environmental protection, whether through consultation or, if disagreement persists, through the complaints procedures in the courts. In order to involve more actively all those interested in water issues (citizens, concerned parties, NGOs) the WFD will require information availability and accessibility and consultation with all these stakeholders once river basin management plans are established.

Except for reiterating the fundamental role of public involvement towards the promotion of environmental goals this Directive also underlines the necessity of providing information in an “active” way, marking a shift both in the relation among the public and authorities/institutions responsible for the collection and dissemination of appropriate information and in their internal structure since they have to be prepared (technically and structurally) to guarantee these services in a user-friendly way.

Although there are no researches or surveys indicating the common sources and the extent to which the public seeks out information in the Mediterranean region, the percentage of citizens requesting information from state agencies in an active way seems to be still very small. Apparently, TV, newspapers and magazines are still the main sources of environmental information. However, expressed levels of trust in the media are relatively low and people interpret media narratives in different ways, so the effects are uneven and differentiated rather than universal. However, this percentage is rapidly increasing, as are other forms of more active search for information through the Internet and environmental NGOs.

The authority of the information provider and the trust (or lack of) that the public has in such institutions becomes critical to the ways in which the information is received, evaluated and acted upon. Surveys done by the Eurobarometer in 1995 and 1999 show that in the European Mediterranean countries environmental protection organisations are considered to be the most reliable sources of information about the state of the environment and environmental issues, while industry is the least trusted source, followed by main political parties and public authorities.

Breakdown of trust in various institutions leading to an ineffective involvement of the public into environmentally sound actions is due to several reasons. One of these, maybe the most important one, refers to the common perception of these institutions as being acting primarily to defend their own political or economic interests rather than that of the wider public good.

The contrast among the recognition of the value of local knowledge and experience with official pronouncements of what is at stake is a further possible source of conflict.

New questions are emerging around the recognized problems of information overload, the complexity of information and appropriate levels of presentation, as well as the plurality of sometimes conflicting information sources. This has led to the provision of information becoming more closely scrutinised and more attention being directed towards issues of effectiveness and efficiency. Targeting information for particular uses is increasingly recognised as central for information providers and at the same time raises questions about information control, labelling of information, etc. Little is known about the ways in which information is understood e.g. by water users, including the public, and how this understanding motivates or constrains water saving or other environmentally beneficial action. Yet understanding this relationship is fundamental to the effective provision of information.

Education and awareness raising

Both education and awareness raising on water issues is much about influencing attitudes and social norms of young generations and communities in such a way that behaviour compliant with an efficient, environment-friendly and safe use of water resources is promoted and social pressure towards sound and sustainable policies is stimulated. Increasing attention is therefore given, in these days, to the education of children and youth on water related topics. Today's children are the decision-makers of tomorrow and will therefore be the ones to decide the future use of our world's water resources. Education can help raise the next generations with knowledge and attitudes that promote the wise use of our world's water resources.

Increasing children's knowledge can help create a greater awareness of the importance of water or the relevance of certain aspects of water (i.e. the importance of *wetlands* and drinking water quality or of the hydrological cycle, but also emphasis on behavioural changes such as washing one's hands with soap or keeping paint and chemicals away from streams, etc.).

School programs and campaigns, as well as the integration of water issues into regular school subjects, are the main ways to promote knowledge, change attitudes and encourage action among children and young people. Cooperation among schools and NGOs can help setting-up programs having an optimal combination of different objectives and a balance between educational, behavioural and promotional aspects, while cooperation with media can support publishing and spreading the results of various initiatives on a wider scale than that of schools and educational settings.

Media, both of conventional (printed media, TV) and non-conventional nature (messages on water bills, games, transport tickets, comic books, etc.) are essential allies of organisations, institutions and bodies promoting awareness raising efforts and initiatives. Of course, the choice of suitable and most effective media in the coverage of specific events and in the wide spreading of particular messages depends on several factors such as the kind of issue to be promoted, the groups targeted and their cultural and social background.



Education

Gender and water resources management

In developing countries, women and girls, as a whole, spend an estimated 40 billion hours every year hauling water from distant and, frequently, polluted sources. They have been reported to spend as much as 8 hours per day carrying up to 40,8 Kg of water on their heads or hips (El-Kady, M and A. Hamdy 2002).

Women's role in water management is vital, as they are the real custodians of the family's water requirements. They are usually the ones that have to withdraw, carry and store the water and make sure that there is clean water in the household for drinking, washing, cooking and cleaning. They care more than men do about the quality of the water used, in order to have a healthy family, especially when it concerns the children. At the same time, in most of the Mediterranean region, women are key and learned persons in matters relating to irrigation and resource allocation. They are involved in irrigated agriculture either by way of assisting their husbands or by being land owners themselves and holders of their own farm enterprise.

In spite of this, water resources management and irrigation programs and projects are mostly directed to men and to the crops they grow. Women's "secondary" crops (vegetables, fruits, spices and "traditional" food crops) and their non-agricultural water consuming activities (for example watering small animals, cooking, laundry, bathing, etc.) are simply not visible and in many cases are not taken into account when calculating water needs. Equal participation and control in the planning of water schemes and in water resources management is therefore required as it is expected to produce multiple benefits on the local economy, nutrition, health, social life and environment.

However, promotion of gender equity in water management presupposes an entire set of changes in the actual conceptual framework that still fails to see women as true economic actors and resource managers. Some of the needed changes may include:

- to remove the existing barriers (discriminatory procedures, practices and laws) that exclude women from property management or from having access to productive processes and practices, such as land and water, but also access to credit, basic services, health, family planning. A consideration of the regional/local dimension is crucial to this purpose;
- to invest in education and training, providing, for example, special educational courses in hygiene and sanitation, but also providing specific measures that might increase productivity of women's work in the great variety of their working circumstances;
- to ensure women's participation, provision of information and consultation. Often information is not made accessible to women and certainly rural women are the most frequently excluded. Governments and international agencies should be

therefore committed to raising the educational levels of girls and women and to making information available through appropriate agencies. Fundamental is also that the many issues women are confronted with, especially those related to their productive role are not ignored, meaning such goals as increasing their market competence, access to new technologies, etc.

Since adequate information and communication about rural populations is generally lacking, decision-makers at all levels, as well as civil society organizations, experts and the media should be made aware of this situation and become committed to modifying the present situation. This presupposes that accurate information about the needs of the rural population is made available and that the gender variable has to be considered as a key element of information and planning.

2.11. NEW PROGRAMS AND PROJECTS ON THE PROCESS

Mediterranean Education Initiative for Environment & Sustainability with an emphasis on water and waste - MEDIES

MEdIES is a WSSD Type II Initiative on Education for Environment and Sustainability (EfES) that was launched in Johannesburg during the World Summit on Sustainable Development. It has an estimated total duration of 5 years (2002-2007).

Leading partners of the initiative are MIO-ECSDE together with UNEP/MAP and UNESCO. The initiative is officially supported by Greece and in particular by the Hellenic Ministry for the Environment, Physical Planning and Public Works. There are many more confirmed partners to the initiative such as many Mediterranean Governments (through relevant ministries or other governmental agencies), Universities, NGOs and IGOs active in the Mediterranean region, etc.

The main objectives of the initiative, compatible with the principles of sustainable development, are:

- Wise management of freshwater resources
- Wise management of wastes
- Facilitation of networks of educators

MEdIES aims to facilitate the educational community and students to contribute in a systematic and concrete way in the implementation of Agenda 21 and the Millennium Declaration Goals (MDGs), through the successful application of innovative educational programmes in countries around the Mediterranean basin. These educational programmes will be based on cross-cutting themes (freshwater and wastes) in the existing school curricula.



The Core of this initiative is the **Network or Circle of Educators for Environment and Sustainable Development** in countries around the Mediterranean basin, that will implement the integrated educational programmes on water, wastes, etc. as a vehicle to sustainable development. The MEdIES interactive webpage (www.medies.net) provides the platform for the exchange of experiences and "know how" in educational matters of all partners involved. This exchange and close collaboration of countries of the northern and southern Mediterranean will allow the development of a methodological framework, to be evaluated and further implemented in other regions.

Governance

Water Governance

One of the concrete achievements of the first year of the Mediterranean Dialogue on Effective Water Governance (DEWG) is the decision taken at the December 2002 Workshop, in Athens, to create two Circles. **The Circle of Mediterranean Parliamentarians** from the national parliaments of Mediterranean countries and the European Parliament and **the Circle of Mediterranean Journalists/Media**, on priority environmental and sustainable development issues, with emphasis on effective water governance and IWRM. These two circles-networks are important in connecting the "shapers" of the public opinion to the "drafters" of legislation. Both groups, together with the Circle of Educators play a decisive role in formulating, presenting and defending public opinion on water issues and on issues of environment and sustainable development, in general.

A set of activities is planned for the coming years aiming to further develop the Dialogue. These include: the facilitation of the Circles of Parliamentarians and Media, an assessment on water legislation in Mediterranean countries and a focus of activities in the Balkan sub-region. Effort will also be made to bring the Mediterranean DEWG at the country and/or local level with national and/or *river basin* meetings.

In addition, the idea for the elaboration of a *Strategic Plan for promoting water governance at regional level and in the Mediterranean countries* was presented and agreed during the March 2002 Conference, in Athens and is expected to have its practical follow-up in the following years. It was recognised that a large number of individual initiatives have been undertaken while a number of regional organisations and networks, addressing water governance at different levels, are active in the Mediterranean. Moreover, the differences in overall governance schemes existing currently in the Mediterranean (EU countries, EU accession countries, Euro-Mediterranean countries and non Euro-Mediterranean countries) should be considered. Such a Strategic Plan should identify ways for promoting better coordination among these initiatives and networks. It should also be useful for identifying and proposing institutional and administrative reforms, new and innovative regulatory and financial instruments, as well as necessary infrastructures to be supported by existing and new funds (e.g. MEDA) and bilateral support.



In this framework a close cooperation with the **Mediterranean Component of the EU Water Initiative -Water for Life (MED-EUWI)**- upon its establishment and operation is foreseen.

This Component is intended to give particular emphasis to Mediterranean priorities, according to needs and strategies defined in partnership with governments, the European Commission and major regional stakeholders aiming to assist the design of better, demand driven and output oriented programmes, to facilitate better coordination of water programmes and projects, targeting more effective use of existing funds and mobilization of new financial resources and to enhanced cooperation for their proper implementation, based on peer review and strategic assessment.

Central themes of the Mediterranean Component will be:

- Water supply and sanitation, with emphasis on the poorest part of the societies
- Integrated water resources management, with emphasis on management of transboundary water bodies
- Water, food and environment interaction, with emphasis on fragile ecosystems
- Non-conventional water resources

Details on concept and foreseen activity are described in the *Operation Plan of MED-EUWI* of the Mediterranean Component, elaborated within the 1st half of 2003 and processed through regional consultation.

The Euro-Mediterranean Water and Poverty Facility

The Euro-Mediterranean Water and Poverty Facility (WPF) is a WSSD Type II Initiative, led by Greece (through the Ministry of Foreign Affairs), Egypt and GWP-Med. The governments of Egypt, Greece, Morocco and Tunisia, several intergovernmental organizations, water professionals and institutes, NGOs, multi-stakeholder platforms and local authorities in the region have confirmed their partnership in the WPF which was officially launched during the WSSD on 2 September 2002, at the Water Dome in Johannesburg.

The WPF, which is already a building block of the EU Water Initiative (also launched in Johannesburg), has as its main aims:

- To assist in improving the livelihoods of poor people primarily in urban areas of the Mediterranean, particularly in relation to water and sanitation
- To contribute in designing guidelines on social performance of water pricing
- To develop guidelines and expertise in order to facilitate the integration of poverty reduction components in major water projects of the region
- To develop functional tripartite initiatives to facilitate regional and national investment on water and poverty initiatives.



Key dimensions to be addressed by the WPF are: improving livelihoods, improving health, mitigating vulnerability of the poor under extraordinary conditions and events such as disasters related to water.

The WPF does not intend to handle or manage investment for *water supply* and sanitation programmes. It will elaborate, in collaboration with both donors and recipient partners and the competent authorities and bodies, common strategies and action plans incorporating, as much as possible, the poverty eradication components in on-going and new projects.

In addition, it will act as a multiplier for sustainable investment in the water sector securing, in parallel, the introduction and impact of poverty reduction components in major water projects - particularly those financed by European sources.

Finally, it may act as a match-maker between the supply and demand side in projects targeting water supply and sanitation for the poor, starting with the urban ones.

The Water Media Network

It is a global initiative designed to help journalists examine the social, environmental, regulatory and financial issues relating to water, and experience the difference that water can make to the economy in the different regions of the world. The program features workshops, field visits, distance learning courses and more. This initiative is a program of the *World Water Council's 3rd World Water Forum* and is funded by the governments of The Netherlands and Japan and the World Bank Institute. The activities lead up to the 3rd World Water Forum in Kyoto 2003, where some 5000 international water specialists, politicians and the media convened to avert the looming water crisis in next century.

Educational activities promoted in the frame of the network are designed to help journalists understand the policies needed to create an enabling and lasting environment for managing water resources and for delivering water services to people, especially the poor. The initiative is designed to reflect the vision that water should be managed in a holistic approach with participation from all levels of government, civil society and the private sector.

Workshops, distance learning and field trips organized by the network focus on constructive dialogue that engages journalists in the process of reform, to foster dialogue on issues associated with the protection of water resources, provision of *water supply* and sanitation services. Journalists also have the possibility to explore the policies relating to governance, pricing, and regulation of water to better assess the costs and benefits of different approaches. Programs are also designed to encourage the role of journalists as a "watch group" for water resources development and management in order to help ensure social accountability of projects.



2.12. MOBILIZING INVESTMENT FOR SUSTAINABLE DEVELOPMENT

Generating more funds for water infrastructure and services, which is a priority in most of the countries in the region, cannot succeed if it is viewed purely as a supply-led exercise, focussing on financial engineering and mobilising extra aid. A crucial part of the task will be to create the right conditions in the countries needing the funds. Without these conditions the funds would be ineffective and even counter-productive, if they were seen to be wasted.

The setting of such an enabling environment for finance will require drastic reforms in the way the water industry is organised and delivers services.

The following topics, among others, deserve consideration:

- *Reforming public utilities* to improve their commercial orientation and financial autonomy. Because of the current predominance of public sector provision, this is where the greatest mileage is.
- *Maximizing financial leverage of civil society.* Delegation of responsibility to users themselves, client associations, community-based organisations (CBO) and non-governmental organizations (NGOs) could release new funding sources.
- *Engaging local service providers.* Currently some parts of the population rely heavily on local providers operating in parallel to public distribution networks. Some of these are in the 'informal' sector, some are illegal or outside the law. Many are highly capitalized and most are self-funding or use local financial intermediaries. They represent a resource to be encouraged, upgraded and regulated as necessary.
- *Creating regulatory capacity.* Regulation is essential for public as well as private operators, to monitor their performance and fulfilment of contractual obligations.

At present, external funds supporting the water sector and water projects in general, in developing countries of the Mediterranean region are coming from the following sources:

Loans

- International Financial Institutions (IFIs) and Official Development Assistance Agencies such as the World Bank, the European Investment Bank, the Asian Development Bank and national aid/investment bodies such as the US Agency for International Development and Germany's Kreditanstalt fuer Wiederaufbau. In the MENA region they also include bodies such as the Kuwait Fund for Arab Economic Development, the Arab Bank for African Economic Development and the Islamic Development Fund.



Grants

- From the European Commission, primarily through the **EuropeAid Co-operation Office**. In one of its supporting Directorates there is a unit for NGOs, another for Co-financing and yet another on Environment, that may be the most relevant to IWRM. Besides contracts to provide services, supplies and works to beneficiary countries, external aid is also given for projects proposed by NGOs, in the form of grants. Usually, the aid is provided under one of the EC external aid instruments or under specific budget headings. Support to NGOs and water are two of the most relevant sectors covered by the **Development Directorate General**. Funds in these sectors are provided through budget lines by the EuropeAid Co-operation Office. Grants for co-financing operations undertaken by European NGOs are generally financed through the B7-6000 Budget line, the Commission's principal instrument for supporting NGOs in developing cooperation programmes and projects to raise public awareness on development issues.

The **Environment Directorate General** also funds actions and projects by means of calls, generally on an annual basis. Besides general calls for proposals, there are a number of specific financial instruments such as LIFE, which involves three major areas of action: LIFE-Environment, LIFE-Nature and LIFE-Third countries.

- From the **Global Environment Facility (GEF)** that forges international cooperation and finances actions to address six critical threats, among which figures the degradation of international waters (the others are: the global environment, *biodiversity* loss, *climate change*, ozone depletion, land degradation, and persistent organic pollutants).
- From the **Mediterranean Environmental Technical Assistance Program Pilot NGO Small Grants Facility (METAP SGF)** providing support for small-scale innovative activities that support the METAP priority issues, one of which is to cope with and reduce the effects of environmental degradation in the Mediterranean and are initiated by community-based and non-governmental organizations. METAP-Phase IV (2001-2005) focuses on three priority areas/pillars which also include water resources management:
 - Water and Coastal Resources Management
 - Solid Waste Management
 - Policy Instruments facilitating environmentally sound investments (e.g. EIA, tools and regulations, ways to make trade and environment mutually supportive, etc.)

CHAPTER III: THE NEW FOCUS: WATER GOVERNANCE AND IWRM

3.1. GOVERNING WATER WISELY

What is Water Governance?

Governance has been consistently emphasized as one of the main elements of sustainable water resources development and management since its emergence as a key issue in the 2nd World Water Forum (The Hague, 2000). Since then the theme of water governance has been taken up in numerous initiatives and there is now an increasing appreciation of its importance and nature.

A consensus is now emerging on the characterization and attributes of water governance defined as *"the multiple political, social and administrative systems that are (or must be) in place, which influence the development and management of water resources and the delivery of water services at different levels of society"*.

Governance in general comprises the body of policies, rules and practical procedures that recognize and set out the specific roles and responsibilities of different stakeholders - in the case of water, the community, the public sector, the private sector, and the individual. A governance structure comprises the mechanisms, processes and institutions via which members of the public, as well as groups, indicate their interests and exercise their rights, as well as meet their obligations and find ways to resolve their differences. Bringing this together, **water governance embraces the range of political, social and administrative systems that are put in place to allocate, develop and manage water resources and the delivery of water services at all different levels of society.**

Within this definition initiatives to improve and/or achieve water governance can cover a whole range of activities falling within the institutional framework of water resources and under the umbrella of IWRM.

However, the main issue to improve water governance is the need to balance social pressures with economic demands and environmental needs. This involves managing risks, promoting awareness and understanding and mobilizing the political will to make decisions and see them through to implementation. It means acknowledging the potential of providing the necessary water infrastructure, recognizing that it can be the basis for sustainable economic growth and poverty reduction and, in case of transboundary waterways of shared water bodies, it can even play an important role in improving relations among *riparian* countries. In this sense water governance is mainly a political matter.

The achievement of an effective water governance presupposes considerable changes in the existing processes and structures that embody sometimes very old, deeply rooted and therefore difficult to overcome habits, perceptions and beliefs.



The 'enabling environment'

Some central general principles have been identified as constituting the basis for the creation of the appropriate 'enabling environment', to promote effective water governance and the successful implementation of IWRM, the approach advocating a move towards a much more integrated and coordinated water development and management process than are currently practiced.

These principles include the following:

- *Accountability*, needed in the performance of water service providers and in resource management and conservation, including the allocation of water to high value uses, to the poor and vulnerable groups and for ecosystem management.
- *Participatory* development approaches, involving public, private, community and civil society organizations, users and other stakeholders. These are essential, as is recognition of the key gender issue and the full participation of women as well as other vulnerable groups.
- *Preventability*, referring to the existence of laws, regulations and policies to regulate water sector activities and their fair and consistent application.
- *Transparency*, i.e. the timely availability of information about water policies and projects to the general public and clarity about government rules, regulations, policies, targets and decisions in the sector.
- *Reasonably* well functioning political and administrative systems to make it all work.

What needs to be done?

In order to achieve the optimum governance structure there is a range of issues that need to be ensured. These include:

- *The institutional framework* - the definition and establishment of laws, rights and licenses. If drawing from the experience of other countries, then it is essential to adapt laws and regulations to the local situation and not simply adopt them. The responsibilities of the different actors in the sector have to be set out. Standards are needed: for water quality and service provision also under unfavourable circumstances (especially for the poor), for the environment, for land-use management and for the construction and management of infrastructure which will affect the quality and quantity of water resources. The framework must also include the international, national and state resource management agencies, *river basin* and *aquifer* management agencies and *watershed* management institutions.
- *The management instruments* - which include the regulatory arrangements. Again it is essential that they are appropriate to local circumstances and not just

copied from elsewhere and imposed. Also, they must be independent, strong and well resourced because investment in regulation is as important as investment in infrastructure. Standards and plans are required, as well as effective mechanisms for stakeholder participation; knowledge and information systems that increase transparency, motivate effective water allocation, use and conservation, are needed, which also secure the maintenance and physical sustainability of the water resources systems.

- *The development and management of infrastructure* - for annual and multi-year flow regulation for *floods* and *droughts*, for multi-purpose storage and for water quality and source protection; in addition, for the distribution of *water supply* to communities and to irrigators and the collection and treatment of wastes and the management of urban storm water.
- *The political economy of water management and reform*, in which there is particular emphasis on the distribution of benefits and costs and on the incentives which encourage or constrain the more productive and sustainable resource use.
- *Decentralization/subsidiarity*. In view of the past failures of a centralized government approach to water management, decentralization of management is essential, within the enabling environment created by governments. The principle of subsidiarity should apply, involving the delegation of responsibility and authority for water management from governments, down the line, to the lowest appropriate level of governance with the capacity and resources to cope, including sufficient competence and credibility to borrow funds.



3.2. MAKING WATER GOVERNANCE IN THE MEDITERRANEAN EFFECTIVE

The Mediterranean Dialogue on Effective Water Governance (MDEWG)

The term 'governance' is relatively new in the Mediterranean, particularly when it concerns natural resources issues. The concept and content of 'governance' is not yet well developed or even understood in all its aspects.

The opportunity to discuss the issue in the Mediterranean in a structured and coordinated way was for the first time offered by GWP-Med through the Mediterranean Dialogue on Effective Water Governance (DEWG), which is part of the global dialogue run by GWP, UNDP and ICLEI. In fact the Dialogue aims to assist in identifying gaps and problems, agreeing on shared objectives, as well as on possible solutions and practical ways to overcome the obstacles, formalizing the process of interaction amongst key players and elaborating on their duties and competencies. The process and its outcomes are expected to enhance the capacities of stakeholders to address and tackle more effectively the complex and inter-related issues of water governance at Mediterranean and country level.

During its first year (December 2001 - December 2002), the Mediterranean DEWG, facilitated by the Secretariat of the GWP-Med and member networks, was based on a series of regional and sub-regional workshops, with the participation of representative organizations from the involved sectors and many stakeholder groups.

Activities of the first year of the Mediterranean DEWG included one regional, one sub-regional and two target-group events:

- The process was initiated with the GWP-Med sub-regional workshop on *'Effective Water Governance in North Africa and the Middle East'*, 20-21 December 2001, Cairo, Egypt, organized by MIO-ECSDE and CEDARE. The workshop took place 'back-to-back' with the European Rio+10 Coalition's *'Region-to-Region Dialogue - Workshop on Water Valuing and Poverty in the Mediterranean'*, 19-20 December, Cairo, Egypt and was attended by 160 participants from 24 countries.
- The Dialogue's activities continued with the GWP-Med regional workshop on *'Effective Water Governance'*, 19-20 March 2002, Athens, Greece, organized by MIO-ECSDE and GWP-Med, attended by 140 participants from 26 countries.

Academia and research institutes have been identified among the target groups that should be addressed by the Dialogue. Particularly in the EU Member States, academia is playing a major role in shaping and implementing elements of the EU Water Framework Directive. A *workshop on the implementation of the EU Water Framework Directive* (6 September 2002, Athens) was organized by MIO-ECSDE and GWP-Med as part of the 5th International Conference of the European Water Resources Association (EWRA), 4-8 September 2002. The Conference was attended by 52 participants from 10 countries.

The Mediterranean DEWG has also benefited from the results of two conferences supported / co-sponsored by GWP-Med:

- The *Forum on Progress Towards Water Demand Management in the Mediterranean Region*, 3-5 October 2002, Fiuggi, Italy, organized by Blue Plan (MAP/UNEP), and
- The *International Conference of Basin Organisations*, 4-6 November 2002, Madrid, organized by the Spanish Government and INBO (International Network of Basin Organisations).

The first year of the MDEWG was concluded with the *GWP-Med Mediterranean Workshop on the Role of Parliamentarians and the Media for Making Water Governance Effective*, 12-13 December 2002, Athens, organized by MIO-ECSDE and GWP-Med. The workshop was attended by 123 participants from 23 countries, among them 18 Members of National Parliaments from 11 countries and about 25 journalists.

It is important to stress that the Dialogue process itself is considered equally important to the outcomes of the consultation because it offers a model of consultation and public participation.

The outcomes of the Mediterranean DEWG during 2002 was channelled into the preparations for the 3rd World Water Forum (Japan, March 2003). They were also presented and followed up during the Greek Presidency (1st half of 2003) and the Italian Presidency (2nd half of 2003) of the European Union.

What are the main features and outcomes of the MDEWG?

Among the *main priority issues* addressed in the Mediterranean DEWG were:

- Policy and Institutional Reform
- Legal Frameworks and Law Enforcement
- Participatory Processes and Civil Society Empowerment
- Financial Instruments and Incentives

The *main target groups* for the Mediterranean DEWG were:

- Members of National Parliaments and politicians
- Administrators of national governments
- Local authorities / local governments
- Other involved stakeholders such as the academia, educators the private sector and NGOs
- The media and journalists

During the first year of the Mediterranean DEWG a set of critical issues for the promotion of an effective water governance in the Mediterranean was identified and classified as *Challenges* on which countries should respond and Tools to be used.

Follow up activities were also suggested in order to transfer the Dialogue to the national level, at a second phase.

All these issues are listed below:

Main challenges:

- To establish proper governance for water as a common good
- To overcome fragmentation of institutions
- To overcome single sector approaches
- To correct or supplement inappropriate legislative frameworks
- To promote enforcement mechanisms
- To mobilize financial resources and attract investment



Challenges

Tools

Main Tools

- To promote effective multi-stakeholder participation
- To improve accountability and transparency in water management
- To utilize education and *capacity building* to develop knowledge and skills
- To address specificities and develop appropriate approaches for isolated Mediterranean islands

- Reform / Enhance existing institutional setups
- Revise national policies, strategies and plans to provide for smooth integration
- Develop effective mechanisms for flow of information and public participation
- Build capacities of different actors
- Share experience and knowledge
- Strengthen river basin level management schemes
- Promote riparian cooperation for management of shared water resources

Possible Issues to be addressed in National / Local Discussions

- Policy and institutional reforms
- Participatory processes and civil society empowerment
- Legal frameworks and water law enforcement - Access to Justice
- Financial instruments and incentives
- Monitoring, utilization of data and access to information
- Water reallocation between sectors
- Conflict resolution for competing uses
- Capacity building for better decision making
- Multi-faceted approach in education (technical, economic, social and environmental)

Themes proposed during the DEWG for Local or Thematic Dialogues in Mediterranean countries

- Bosnia-Herzegovina: Requirements for adapting the EU Water Framework Directive
- Croatia: Meeting the standards of the EU Water Framework Directive
- Cyprus: Water reallocation
- Egypt: Financing the water sector
- Egypt: Capacity building for effective governance
- Egypt: Water resources development for desert communities
- Egypt: Coordination between stakeholders for shifting from water distribution to IWRM
- Greece: Implementation of the EU Water Framework Directive
- Greece: Promotion of RBOs



- Israel: Effective decision-making
- Jordan: Enhancing public-private partnerships
- Morocco: Institutional reform for better coordination
- Morocco: Capacity building and education
- Occupied Palestinian Territory: Institutional reform
- Portugal: Enhancing public-private partnerships
- Slovenia: Meeting the standards of the EU Water Framework Directive
- Turkey: Transparency in decision-making
- Turkey: Promotion of the river basin approach

Toolbox

3.3. INTEGRATED WATER RESOURCES MANAGEMENT (IWRM) AND THE IWRM TOOLBOX

The new approach to tackle water resources problems, defined as Integrated Water Resources Management (IWRM), draws its inspiration from the Dublin Principles deriving from the UN Dublin Conference (1992): water as a finite and vulnerable resource, the importance of a participatory approach involving users, planners and policymakers, recognition of the special role of women as water users and water as an economic good with economic value in competing uses and as having key social and environmental roles. The principal criteria are economic efficiency in water use, equity and access for all, and sustainability of vital ecosystems. It advocates a move towards a much more integrated and coordinated water development and management process than is currently practiced. Compared to traditional approaches, IWRM takes a broader view, examines a more complete range of solutions and considers how different actions affect and can reinforce each other. In this new optic water resources are dealt in the broadest possible manner, in the context of the entire economic, social- and eco-systems of the country or region. Operationally this means that policies and programs in other resource areas have to be carefully analyzed to see how they will influence demands placed upon the water sector.



This process of change from unsustainable to sustainable resources management will take time and will need to be implemented progressively and in small pieces to allow incremental reform. In the meantime sectoral developments will continue and it is imperative that they are compatible with IWRM. This approach demands certain requirements (clear laws and institutional roles for example) that cannot be avoided. This may require difficult trade-offs and choices where the local circumstances and the political will for change and progress need to be taken into account.

Most of the likely issues to be addressed are defined in the **IWRM ToolBox** designed by the Global Water Partnership to support the development of this approach. Altogether close to 50 different tools are presented within the broad headings of the *enabling environment*, comprising policies, legislation and financing and incentive structures, *institutional roles*, the organizational framework and capacity-building, *management instruments* such as water resource assessment and plans, demand

management, social change instruments, conflict resolution mechanisms, economic and regulatory instruments and information management and exchange.

The ToolBox is not a manual or simple database but a dynamic, growing resource. It builds on the experience held by water practitioners, specialists and decision-makers world-wide. It covers a broad spectrum of different approaches and policy options, key lessons learned, illustrated with real world cases. It is projected to add feed-back from users of their experience on a regular base, along with new cases, references, names and contacts of new resource persons and new links to websites. The intent is for the ToolBox to be a continually evolving, practical product, constantly improved as knowledge and understanding of IWRM is gained.

The selection of one or more instruments from the ToolBox follows the analysis of the concrete issues to be dealt with and the choice of the strategic options for how to address them. The selection is limited to local circumstances and there is no universal model, a fact which makes the ToolBox a flexible instrument easily adaptable to very different situations and problematics.

www.gwpforum.org/iwrmttoolbox

3.4. PARTNERSHIPS FOR INTEGRATED WATER RESOURCES MANAGEMENT

The Mediterranean has a tradition in cooperation and networking schemes, many of which address issues of sustainable development, environmental protection and management of natural resources. Water is a defined priority in the majority of related regional processes, e.g. Barcelona Convention, Mediterranean Commission for Sustainable Development, Euro-Mediterranean Partnership, etc.

Partnerships have been developed at various levels (governmental and multi-stakeholder) in the region, enhancing cooperation and promoting common action, like CEDARE, CIHEAM and thematic/sectoral networks like IME, MedWet, MIO-ECSDE and MWN.

The Global Water Partnership-Mediterranean (GWP-Med) has provided a cooperation platform on water where most of these networks participate actively, together with Blue Plan (Mediterranean Action Plan of UNEP -UNEP/MAP) and EMWIS (Euro-Mediterranean Information System on the know-how in the Water sector), a program of the Euro-Mediterranean Partnership.

Hereafter will follow a brief description of main Mediterranean networks and co-operations that are, at the present time, very active in the promotion of sustainable water management in the region.

UNEP/MAP

The Mediterranean Action Plan of UNEP (UNEP/MAP) plays an important role in the region's orientation towards sustainable development, facilitating the Barcelona Convention and its related Protocols. Twenty Mediterranean countries, as well as the European Commission, make up the MAP, having as their common objective the creation of a healthier Mediterranean environment, resting on the principle of sustainable development. Inside MAP water resources issues are mostly dealt by the Blue Plan and PAP/RAC (Priority Action Programme/Regional Activity Centre), also in the framework of the Mediterranean Commission on Sustainable Development (MCSD) and as support to the activities of this body.

www.unepmap.gr

The Mediterranean Commission on Sustainable Development (MCSD)

Created as a consultative body to the MAP, its main task is to make proposals to Mediterranean countries and other stakeholders in the region in order to facilitate the achievement of sustainable development models. The MCSD identifies and evaluates major economic, environmental and social problems in the spirit of Agenda Med 21- a version of Agenda 21 adapted to the needs and main issues of the Mediterranean region. It is expected to track the implementation of the proposals it forwards to the Contracting Parties of the Barcelona Convention and to promote cooperation and information exchange concerning activities related to sustainable development in the Mediterranean.

The necessary technical and professional support is provided by MAP which acts as the MCSD Secretariat. MCSD has focused its work on several priority themes and separate working groups have been formed with task managers to tackle each theme, while regional centres of MAP play a supporting role.

Water Demand Management in the Mediterranean region is one of the eight themes tackled to date by the MCSD working groups. PAP/RAC assumed the supporting role to the working group on this issue together with the Blue Plan.

Blue Plan

The activity program of the Blue Plan includes observation, evaluation and exploration of the relations between population, environment and development as well as the realization of studies on priority issues for the whole Mediterranean basin. The contribution of Blue Plan to the Mediterranean Action Plan (MAP) and the MCSD in water demand management issues includes several scientific studies, researches and diagnostics.

At the Workshop of Fréjus, France, organised by the Blue Plan on 12-13 September, 1997 and in which Water Directors from 16 Mediterranean countries participated, as well as members of the MCSD and numerous experts, it was highlighted that there is a necessity to switch from the traditional response to water policies based on supply strategies to an effective management of the demand.



Subsequent to this workshop all *riparian* countries and the European Union - Contracting Parties to the Barcelona Convention - adopted (Tunis, November 1997) the following recommendations:

- To incorporate water demand management effectively in national water strategies, development and environmental policies.
- To develop among the public, economic stakeholders, managers and decision-makers awareness of the importance of loss and waste of water, both in economic terms and in volume of water and to awaken a sense of responsibility among users with a view to better management of water demand.
- To improve among the public, economic stakeholders, managers and decision-makers, knowledge and evaluation of the potential advantages to be gained from more economical management of water demand, laying emphasis on total transparency.
- To undertake practical demand control activities.
- To encourage co-operation among groups of countries facing the same demand management problems and future shortages.

Since 1997, numerous activities and efforts have been undertaken in the Mediterranean region at local, national and international levels in this direction. With the objective to share these experiences with each other the riparian countries and the European Union asked the Blue Plan at the 12th meeting of the Contracting Parties to the Barcelona Convention (Monaco, 14-17 November, 2001) to make a first evaluation of the efforts undertaken and the difficulties that must be overcome.

To this aim the Blue Plan organised, with the support of the Global Water Partnership, Italy and France, the Forum of Fiuggi, Rome (3-5 October, 2002) on the "Progress Towards Water Demand Management in the Mediterranean Region" during which a first evaluation of efforts undertaken and the difficulties that must be overcome was made and new proposals for the Mediterranean countries and their partners towards more effective and integrated water resources management strategies were formulated.

www.planbleu.org

The Priority Actions Programme (PAP)

The Priority Actions Programme is a key component of the Mediterranean Action Plan (UNEP/MAP) itself. PAP has been at the forefront of acknowledging coastal water resources management as a priority issue. In the attempt to propagate and assist in the implementation of a multidisciplinary approach to water resources management, PAP, through the priority actions in the Mediterranean, has actively supported an integrated approach to water resources planning and management.

The activities of PAP extend from numerous seminars, workshops and expert meetings to the implementation of several projects, the most important being the project of water resources management in Malta. As a result of this activity PAP organized, in co-operation with the Institute of Water Technology of the Water Services Corporation of Malta, five successful training courses for participants from various Mediterranean countries. PAP has been concentrating its efforts on providing assistance to Mediterranean States in implementing the general objectives as set out in Chapter 18 of "Agenda 21", a policy document on water resources issues adopted by a large number of governments. In full harmony with priority issues and the general principles of "Agenda 21", "The Med Water Charter" (Rome 1992) and "Agenda Med 21", one of the activities of PAP for the period 1995-6 was the preparation of PAP "Guidelines for an Integrated Approach to the Development, Management and Use of Coastal Water Resources" aimed at practicing engineers, natural and social scientists and managers in the field of water resources development, management and use.

www.pap-thecoastcentre.org

The Global Water Partnership in the Mediterranean-GWP-Med

The Global Water Partnership (GWP) was established in 1996 to support countries in the sustainable management of their water resources. GWP is an independent network open to national governments, research and non-profit organizations, NGOs, UN agencies, multilateral banks, private companies and other institutional stakeholders involved in water resources management.

GWP facilitates the exchange of knowledge, experience and the practice of Integrated Water Resources Management (IWRM). The partnership has a decentralized, self-reliant character through its presently active nine Regional Water Partnerships and twenty Country Water Partnerships. The GWP Associated Programs (APs) provide services on the ground to assist solving problems encountered by stakeholders in water resources management. In this manner these operational, autonomous programs support countries and regions to implement actions towards IWRM.

The Global Water Partnership-Mediterranean (GWP-Med) is a Regional Water Partnership under the global GWP umbrella. The GWP-Med core partners are Mediterranean organizations/institutions with regional coverage and activity: Blue Plan (MAP/UNEP), CEDARE, CIHEAM, EIC, IME, MedCities, MedWet, MENBO/REMOC, MIO-ECSDE, MWN.

The ultimate goal of GWP-Med is to promote the sustainable use of water resources in the Mediterranean region through their integrated management, within the general framework of the GWP.

To achieve its goal, GWP-Med:



- Promotes and sustains a strong partnership in the Mediterranean among competent organisations, through their sectoral regional networks that have an impact on water management.
- Makes the principles of sustainable use and integrated management of water resources (WRM) widely known, recognized and applied by all stakeholders in the Mediterranean, through appropriate mechanisms for sharing information and experience.
- Supports exemplary actions at local, national and regional level that demonstrate the value of applicability and positive impact of the above principles.
- Seeks and facilitates the appropriate international funding and involvement of international institutions for activities.
- Introduces, helps to implement and adapts to the specificities of the Mediterranean region, global initiatives launched or adopted by the GWP.

The Secretariat of the GWP-Med has been hosted since the year 2000 by the Mediterranean Information Office for Environment, Culture and Sustainable Development (MIO-ECSDE).

www.gwpmed.org

CEDARE

The *Centre for Environment and Development for the Arab Region and Europe* (CEDARE) was established on the basis of a joint commitment by the three principal sponsors, namely the Government of Egypt (GOE), the Arab Fund for Economic and Social Development (AFESD) and the United Nations Development Programme (UNDP).

CEDARE was established within the Arab Region and Mediterranean Europe, to become a Centre of Excellence which could assist the region in its efforts to pursue global environmental trends and support national programme efforts in the implementation of Agenda 21, through fostering their national capacities.

CEDARE's main mission is:

- Capacity building of its member countries, promoting skills in environmental management, transfer of technologies, environmental education and development of environmental policies.
- To assist member countries to achieve some of their important national and regional priority goals of sustainable development, particularly in the management of *freshwater* resources, land resources development and urbanization and human settlements.
- Facilitate inter-country cooperation and exchange of information and experience.

Thus, the main function of CEDARE is that of an “enabling” agent in support of sustainable development initiatives at national, sub-regional and regional levels, stimulating the implementation of international conventions and agreements in the region.

www.cedare.org

International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM)

The Centre International de Hautes Etudes Agronomiques Méditerranéens (International Centre for Advanced Mediterranean Agronomic Studies) is an intergovernmental organization with a regional Mediterranean vocation. CIHEAM was founded in 1962 under the auspices of the OECD and the European Council. The Centre currently has 13 member countries: Albania, Algeria, Egypt, France, Greece, Italy, Lebanon, Malta, Morocco, Portugal, Spain, Tunisia and Turkey.

The objective of the Centre is to offer complementary economic and technical teaching and to encourage the spirit of international co-operation among the experts in agriculture of the Mediterranean countries (article 1, CIHEAM founding agreement).

In order to fulfil this mission, CIHEAM organizes post-graduate specialization courses and promotes and co-ordinates research networks on topics of importance for the Mediterranean region concerning agriculture and natural resources.

Many activities of the Centre are jointly organized with national institutions of the member countries, thus favouring evolution towards a **Mediterranean network of agronomic institutions of research and training**.

Besides co-operation with national institutions of the member countries, CIHEAM holds co-operation agreements with international and regional bodies concerned with agriculture in the Mediterranean region (EU, FAO, UNESCO, EAAP, ICARDA, ACSAD, AOAD, etc.).

www.ciheam.org

Euro-Mediterranean Irrigators Community (EIC)

The Euro-Mediterranean Irrigators Community (EIC) is a non-profit association, which gathers organizations dedicated to the administration of surface water or groundwater.

Its main objective is to promote information exchange on irrigation among the irrigators as well as the exchange of knowledge, plans and experiences in order to improve the management and distribution of irrigation water from the legal, administrative, technical and practical points of view.

The aims of EIC are, among others, the following:

- To represent the members before international organizations and associations involved in agriculture, water and irrigation.



- To represent the members and the European irrigators at the European Union and its institutions facilitating the participation of the users in EU water policies, analysing and studying the application and possible impacts of the EU Water Framework Directive on European and Mediterranean irrigation.
- To collaborate with its members and the administrations of different countries to help them in developing new irrigation proposals.
- To explain the positive irrigation effects in Mediterranean countries to the public opinion.
- To exchange technologies and methods that propose improvements and solutions to problems related to the conservation of soil, territory and natural resources, and to the modernization and maintenance of irrigation structures and the hydraulic management of irrigation.

One of the most important missions that the EIC currently has is to show the need of a sustainable agriculture, not only to society but also to irrigators.

www.e-mic.org

Mediterranean Water Institute (IME)

The *Institut Méditerranéen de l'Eau* (Mediterranean Water Institute) is a non-governmental, non profit organization created in 1982 in Rabat and has a specific consultative status in the Economic and Social Council of the UN.

Its main objective is the development of trans-Mediterranean cooperation among local and professional collectives (institutions, experts, etc.) active in water, irrigation and sanitation issues.

The main fields of actions are:

- irrigation
- hydrology and hydrogeology
- drinking water and sanitation
- treated waters, depuration and recycling
- valorisation of the aquatic ecosystems

www.ime-eau.org

MedCities

Medcities is a network of Mediterranean coastal cities created in Barcelona in November 1991 at the initiative of the Mediterranean Technical Assistance Programme (METAP).

The Medcities network is a tool to strengthen the environmental management capability of local administration, but it is also useful in order to identify the domains where a common activation could be the most useful way to improve regional environmental conditions.



The goals of Medcities are the following:

- To reinforce the awareness of interdependence and common responsibility regarding the policies of urban environmental conservation in the Mediterranean basin.
- To strengthen the role and the means (institutional, financial and technical capability) of municipalities in the implementation of local conservation policies.
- Develop awareness and involvement of citizens and consumers.
- Set up a direct cooperation policy in order to implement the partnership between coastal Mediterranean cities without governmental intermediations.

www.medcities.org

MedWet

The MedWet Initiative, guided by the *Mediterranean Wetlands Committee* (MedWet/Com) of the Convention on Wetlands (Ramsar, 1971), is a long-term, collaborative effort towards the conservation and wise use of Mediterranean wetlands.

MedWet brings together all governments of the region (25), the Occupied Palestinian Territories, the United Nations Development Programme, the European Commission, the Barcelona, Bern and Ramsar Conventions, and 8 international NGOs and wetland centres.

The Mediterranean Basin is rich in wetlands of great ecological, social and economic value. Yet these natural assets have been considerably degraded or destroyed. The MedWet Initiative mobilises partners and funds to assist in implementing the Ramsar Strategic Plan in the region.

Basic parts of MedWet activity are conservation actions in wetlands of major importance (especially Ramsar Sites) and the promotion of national wetland policies. MedWet also provides a forum for regional exchange of experience at a technical level and publishes a range of wetland management methodological tools.

www.medwet.org

The Mediterranean Information Office for Environment Culture and Sustainable Development (MIO-ECSDE)

The Mediterranean Information Office for Environment Culture and Sustainable Development is a Federation of Mediterranean non-governmental organisations active in environment and development issues and functions as a technical and political platform and umbrella for NGO intervention in the Mediterranean scene. In co-operation with governments, international organisations and other socio-



economic partners, MIO-ECSDE plays an active role in the protection of the environment and the sustainable development of the Mediterranean region.

The Mediterranean Information Office (MIO), was established in 1990 as a network of NGOs, under a joint project of the EEB (European Environmental Bureau) and Elliniki Etairia (The Hellenic Society for the Protection of the Environment and the Cultural Heritage) and in close collaboration with the Arab Network of Environment and Development (RAED). The expansion of MIO-ECSDE's Mediterranean NGO network and the increasing request for constructive and structured NGO opinions and representation in Mediterranean and international fora, led to the transformation of MIO-ECSDE to its current NGO Federation status with more than 100 members.

Its main objectives are to protect the natural environment (water, air, soil, flora and fauna, biotopes, forests, coasts, natural resources, climate) and the cultural heritage (archaeological and more recent monuments, traditional settlements, cities, cultural diversity, etc.) of the Mediterranean. The ultimate goal of MIO-ECSDE is to promote sustainable development in a peaceful and healthy Mediterranean.

Major tools and methods used by MIO-ECSDE in order to achieve its objectives are the following:

- Promotion of the understanding and collaboration among the people of the Mediterranean, especially through their NGOs, between NGOs and governments, parliaments, local authorities, international organisations and socio-economic actors of the Mediterranean region at all levels.
- Assistance for the establishment, strengthening, co-operation and co-ordination of Mediterranean NGOs and facilitation of their efforts by ensuring the flow of appropriate information among relevant bodies.
- Promotion of education, research and study on Mediterranean issues, by stimulating collaboration between NGOs and scientific and/or academic institutions.
- Raising of public awareness on crucial Mediterranean environmental and social issues, through campaigns, publications, exhibitions, presentations, etc.

www.mio-ecsde.org

Mediterranean Water Network (MWN)

As a result of the First and Second Mediterranean Water Conferences (Algiers, 1990; Rome, 1992) the Ministers responsible for water in the states of the Mediterranean basin and the representative of the European Commission decided to implement the mandate set forth in the Mediterranean Water Charter, in its



Regional Cooperation section, and the Mediterranean Water Network was set up in order to promote this cooperation practice.

Through its structure the Mediterranean Water Network aims to coordinate the different actions that may affect Mediterranean countries in the sphere of water.

Its general aims are to:

- Promote the development and transfer of technology in matters concerning water in the countries of the area, with exchange of information on such aspects as resources and demand assessment, planning methods and techniques, administration of water resources, legislation and regulations.
- Encourage the preparation of programs and plans of joint action and institutional coordination of technical aspects and of investments with transfer of know-how, by means of personnel training courses, exchange of approved experiments and research for the development of new technologies.
- Assure the appropriate financial resources to develop the technologies corresponding to integrated water management in the Mediterranean countries with the backing of other international cooperation organizations, such as the European Union (EU), World Bank, United Nations Programme for Development (UNPD) and others, as well as funds from the member countries of the Network.

Obligations

3.5. INTERNATIONAL, TRANS-NATIONAL CONVENTIONS, OBLIGATIONS.



Water law evolves continuously. At the international level, increased transparency and more inclusive public participation and access to information and to transboundary remedies has been introduced in forward-looking international agreements (i.e. the Aarhus Convention). Other, more specific concerns are addressed in treaties focusing on water and health and aimed at limiting transboundary impact (i.e. recognizing the notion that “prevention pays off”). New initiatives include the proposed European Union Water Framework Directive (innovations include adopting the river basin catchments as units of management, full cost recovery, river basin management plans-a unique plan for integrated water management across Europe) and the UNECE/UNEP sponsored projects on monitoring compliance and public participation.

Unfortunately, the existing water law framework does not concern most Mediterranean countries, specifically the southern and eastern Mediterranean countries which are not members of UNECE and therefore not signatories of the conventions established under UNECE responsibility. The same is valid for the Mediterranean non-EU countries in respect to the framework about water resources management established by the European Union.

The existing legal framework regulating water resources management and water related issues internationally and at EU level is briefly reported hereafter.

UN/ECE Convention on Environmental Impact Assessment in a Transboundary Context (1991)

This Convention stipulates the obligations of Parties to assess the environmental impact of certain activities at an early stage of planning. It also lays down the general obligation of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries. Among the listed transboundary impacts that could result from a specific project figure those on water. They include surface and groundwater (changes in water quality or quantity), coastal water (changes in quality), sediments (changes in quality and quantity of all riverine, estuarine and coastal sediments) and the release of any toxic or hazardous water pollutant, radiation or genetically engineered organisms.

UN/ECE Convention on the Protection and use of Transboundary Watercourses and Lakes (17 March 1992)

This Convention is intended to strengthen national measures for the protection and ecologically sound management of transboundary surface waters and groundwaters.

It obliges Parties to prevent, control and reduce water pollution from point and non-point sources.

The Convention also includes provisions for monitoring, research and development, consultation, warning and alarm systems, mutual assistance, institutional arrangements and the exchange and protection of information as well as public access to information.

UN Convention on the Law of Non-Navigational Uses of International Watercourses (1997)

It is a workable universal framework which provides the basic elements for managing transboundary water courses. Although very general, it is useful in providing the constitutive foundations for a legal regime and a framework that can be used as a preliminary model for regional agreements.

It includes four main pillars:

- The water sharing principles, i.e. equitable and reasonable use and the no-harm rule and a series of factors which are to be taken into account when allocating water
- The obligation of riparian states to cooperate. According to the Convention this cooperation may be achieved through a variety of means; for example setting joint mechanisms and commissions, regular exchange of information and data and notification of planned measures



- The protection of the environment as an integral component of the regime applicable to international watercourses
- The promotion of dispute settlement and dispute avoidance mechanisms

The universal framework provided by the state-orientated UN Convention, is an important step and like all agreements has the additional benefits of providing greater stability and predictability but is far from sufficient to ensure integrated management of all international river basins. An important omission is adequate reference to other stakeholders apart from the states themselves, such as local communities, NGOs and even individuals.

Protocol on Water and Health to the 1992 Convention on the Protection and use of Transboundary Watercourses and Lakes (17 June 1999)

Adopted under the Convention on the Protection and Use of Transboundary Watercourses and International Lakes, the Protocol aims to protect human health through improving water management. The signatory countries agree to prevent, control and reduce water-related diseases through water management systems that use water resources sustainably, give access to safe water and sanitation and protect water ecosystems. The Protocol applies to water wherever it is, including surface freshwater, groundwater, estuaries, coastal water, bathing waters, tap water or wastewater. Real progress under the Protocol involves governments, but the Protocol also recognizes that progress cannot be achieved without the involvement of all stakeholders, water professionals, health professionals, scientific experts, NGOs and local action groups and the public at large. The Protocol reiterates that improvement of the water environment and the protection of human health and safeties have to be kept high on the political agenda as a policy priority.

UN/ECE Convention on the Transboundary Effects of Industrial Accidents (entered into force on 19 April 2000)

The aim of the Convention is to protect human beings and the environment against industrial accidents by preventing such accidents as far as possible, by reducing their frequency and severity and by mitigating their effects also on a transboundary scale (transboundary water courses included).

The Convention also encourages its parties to help each other in the event of such an accident, to cooperate on research and development and to share information and technology.

EU Water Framework Directive

It is considered an innovative and unique forward-looking plan for integrated water management across Europe.



The integrated approach promoted by this Directive has the following key aims:

- Expanding the scope of water protection to all waters, surface waters and groundwater through the setting of quality standards (referring to the quality of the biological community, the hydrological characteristics and the chemical characteristics) and of quantity limits.
- Achieving “good status” for all waters by a set deadline.
- Basing water management on river basins - the natural geographical and hydrological units - instead of according it to administrative or political boundaries.
- “Combined approach” of emission limit values and quality standards. On the source side it requires that as part of the basic measures to be taken in the river basin, all existing technology-driven source-based controls must be implemented and, above this, it also sets out a framework for developing even further such controls (development of a list of priority substances for action at EU level, prioritised on the basis of risk and design of the most cost-effective set of measures to achieve load reduction of those substances). On the effects side, it coordinates all the environmental objectives in existing legislation and provides a new overall objective of good status for all waters requiring that where the measures taken on the source side are not sufficient to achieve these objectives, additional ones are required.
- Getting the prices right. The introduction of pricing is maybe one of the most important innovations of the Directive. Adequate water pricing is an incentive for the sustainable use of water resources and helps therefore to achieve the environmental objectives under the Directive. Member States will be required to ensure that the price charged to water consumers, such as for the abstraction and distribution of fresh water and the collection and treatment of waste water, reflects the true costs.
- Promoting citizens involvement through the provision of information and ensuring consultation processes.
- Streamlining legislation. The WFD is supposed to rationalise the Community’s water legislation by replacing seven of the “first wave” directives (those on surface water and its two related directives on measurement methods and sampling frequencies and exchanges of information on fresh water quality, the fish water, shellfish water and groundwater directives and the directive on dangerous substances discharges) and taking over in its frame their operative provisions.

Due to its importance and indirect relevance also to water issues the Aarhus Convention is also listed herewith:

UN/ECE Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (1998)- Aarhus Convention

This Convention entered into force on 30 October 2001 and represents a new kind of environmental agreement as it links environmental rights and human rights. It acknowledges that we owe an obligation to future generations and it establishes that sustainable development can be achieved only through the involvement of all stakeholders. It links government accountability and environmental protection. It focuses on interactions between the public and public authorities in a democratic context and it forges a new process for public participation in the negotiation and implementation of international agreements.

The subject of the Aarhus Convention goes to the heart of the relationship between people and governments. It is not only an environmental agreement, it is also a convention about government accountability, transparency and responsiveness. The Aarhus Convention grants the public rights and imposes on Parties and public authorities obligations regarding access to information and public participation and access to justice.

