

# **Integrated Catchment Management to Address Environmental Degradation in the Mediterranean Region:**

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## ACRONYMS

|           |                                                                    |
|-----------|--------------------------------------------------------------------|
| CBD       | Convention on Biological Diversity                                 |
| CCD       | Convention to Combat Desertification                               |
| CEDARE    | Centre for Environment and Development for Arab region and Europe  |
| CIHEAM    | Centre International des Hautes Etudes Agronomiques Méditerranéens |
| EU        | European Union                                                     |
| FAO       | Food and Agriculture Organization                                  |
| ICID      | International Commission on Irrigation and Drainage                |
| IME       | Institut Méditerranéen de l'Eau                                    |
| GWP       | Global Water Partnership                                           |
| MCSD      | Mediterranean Commission on Sustainable Development                |
| METAP     | Mediterranean Environmental Technical Assistance Program           |
| MEDWET    | Mediterranean Wetlands                                             |
| MEDTAC    | Mediterranean Technical Advisory Committee                         |
| MIO/ECSDE | Mediterranean Information Office                                   |
| MAP-UNEP  | Mediterranean Action Plan –United Nations Environment Programme    |
| MWN       | Mediterranean Water Network                                        |
| SEMIDE    | Système Euro-méditerranéen d'Information dans le Domaine de l'Eau  |
| SMAP      | Short and Medium-term Priority Environmental Action Programme      |
| UNESCO    | United Nations Education, Sciences and Culture Organisation        |
| WWC       | World Water Council                                                |

## EXECUTIVE SUMMARY

Worldwide, the integrated management of river basins is widely recognised as one of the most basic elements for sustainable development. In the Mediterranean region it is even more important, both for human development and the environment.

Because of its natural conditions (climatic and topographic) the Mediterranean basin is prone to frequent droughts and floods, forest fires, soil erosion, and violent seasonal run-offs on dry river beds, some of which are often used as human settlements. Water availability is one of the most pressing constraints to human development in our region: a growing population, increased demand for irrigation, growing stress on our freshwater ecosystems, and a rising demand from seasonal visitors in the dry summer season have all led countries to maximise supply-side solutions for growing human needs with limited understanding of linkages at basin scale.

Water resources are overexploited and irregularly distributed in the region. They are also becoming scarcer. Currently, agriculture activities entail 72% of the water consumption in the Mediterranean basin (whereas the industrial sector uses 17% and only 10% is used for domestic reasons). Besides the excessive consumption of water, the generalisation of irrigation has other effects: gradual degradation of the most fertile soils, particularly by salinisation, and the accumulation of chemicals in soils and waters, taking their fee from man and nature through soil degradation, wetland loss and biodiversity reduction in freshwater ecosystems.

To date, the expansion and intensification of human uses has already claimed too many environmental resources: over 50% of all wetlands, over 70% of available water, and a high percentage of basin ecosystems, not only forests and wildlands but rivers themselves, some of which have been reduced to a seasonal trickle, or a stagnant and polluted drain. Around 2,000 dams in our rivers and water storage and distribution systems with net water losses in excess of 30%, have increased evaporation, fragmented river ecosystems, threatened the minimum ecological water flows during the long dry periods, and reduced storage capacity due to siltation, while coastal fisheries shrink as nutrients are held back in dams, coastlines erode and river deltas slowly sink because of lacking sediments. These undesirable effects are expected to become more serious as climate change causes more desertification, higher erosion in watersheds and higher sea levels on the coast. The question is whether, and how, to avoid these negative consequences in a quest for more sustainable forms of catchment management.

As the consumption of renewable water resources passes through the recognised limits of sustainable use, it is clear that in many cases there exist few new supply-side solutions. Better use must be made of existing resources, and a range of programmes are underway to help achieve this. Equally, it is appropriate to ask how to manage the transition from the process of constantly diverting and removing water from natural systems that has been the trend for 100 years, towards trying to look at how to provide water for ecosystem support as a contribution to sustainable development.

If sustainable development is to be achieved water distribution must seek an equilibrium between different demanding and competing sectors, taking into consideration the social, economic and environmental values of water, and the existing relation between surface and groundwater, land administration and the need to maintain the integrity of ecosystems. River basins, lakes and aquifers must be the primary framework for water resource management. To this end, we need to promote the necessary institutional and participative mechanisms to make current water diversion practices more environmentally sustainable.

This concept has been broadly endorsed through the Agenda 21 for the Mediterranean (Tunis 1994), accepted by all Parties to the Barcelona Convention, which states that “*Integrated water resources management is based on the perception of water as an integral part of the ecosystem.....water resources have to be protected, taking into account the functioning of aquatic ecosystems and the perennality of the resource, in order to satisfy and reconcile needs for water in human activities*”. Further reaffirmation of this approach comes from the World Water Forum and the Bonn International Conference on Freshwater (2001). These high level meetings raised the need of greater dialogue between agricultural and environmental sectors to develop a shared vision on water management, a knowledge bank to sustain dialogue and a network of field projects at local levels and river basins, implementing innovative focuses and solutions improving the sustainability of water provision for agriculture and for nature.

Among the barriers to better water planning and use are inappropriately low water prices, inadequate information on new efficient technologies, inequitable water allocations, building dams, and government subsidies for growing water-intensive crops in arid regions.

The first challenge is ensuring sustainable yields of water through all seasons and maintaining the capacity of basins to deliver clean water supplies. For our region, this means the regeneration of vegetation cover in most basins, land-use planning schemes, reforestation, prevention of fires, overgrazing, and the resulting erosion, plus balancing down the exploitation of groundwater extraction to sustainable rates.

The second challenge is reducing water demand. Most importantly, agriculture as the main user of the resource should be much more water-efficient everywhere (with the possible exception of the Balkan countries, France and Turkey).

Experience to date shows that water pricing and decentralization of irrigation management with a direct responsibility from the users are amongst the main tools for water saving. Many programmes are underway on this issue in the region.

Thirdly, the question is raised of how to allocate water to environmental purposes, when extraction begins to reach levels that threaten ecosystem functions and integrity. Should efficiency gains be returned to the natural system, or at least used to offset need for additional new supply? Examples in the region are increasingly developing methods and approaches for addressing this issue.

## 1. Scope of this document

Proposed by IUCN Mediterranean members as a priority for IUCN action in the region the IUCN Centre for Mediterranean Cooperation is identifying needs and opportunities in promoting integrated water management (IWM) in the Mediterranean basin. This is a complex issue, a holistic and multisectorial approach to a strategically important and scarce resource. IWM includes land use planning, water storage and distribution, water use and water disposal, including the needs for human use and for the ecosystems, and finding a balanced trade-off between all these factors and interests. Water is one of the most common substances in the planet, but unfortunately 97 percent of it is salty, and much of the rest is locked up in ice. Numerous political, economic, social, scientific, environmental sectors are interested on this topic both at local and national levels. The water agenda is of such a strategic importance in our region that many international and multilateral organisations and donors have included water management within their priorities for the Mediterranean.

Among the three focuses of World Water Vision (water for people, for nature, for food), IUCN proposes to concentrate its efforts on the *water-for-nature* trade-offs, particularly in relation to *water-for-food* because of its significance in the consumption of this scarce resource: Mediterranean irrigation systems account for over 70% of water used in the region. IUCN has launched its *Initiative for water and nature* (2000) focusing on these trade-offs, as opposed to sectorial and vertical approaches, which too often have left aside environmental concerns and criteria.

The present document deals with the relationships between basin management and environmental problems, and will propose possible fields of action for IUCN and its partners in the region<sup>1</sup>. Particularly, and rather than on aspects such as urban use, water price or infrastructures, this document will focus on the challenge of maintaining valuable ecosystem functions and services in the context of increasing use and diversion of water.

This report also proposes strategy directions that IUCN could follow on this topic. The subject was dealt with from a pan-Mediterranean point of view, i.e., details about national situations will only be given as particular examples.

This document includes sections on:

- Diagnosis of the situation on water use and management of river basins.
- Main international policies and instruments with an application in our countries.
- Main Mediterranean (regional) policies, instruments, programmes and organisations currently involved in water and basin management.
- Proposed strategy for the IUCN, taking into account organizational gaps, IUCN strengths, and the main field opportunities with a regional significance (separate document).

This report was circulated to selected national and international organisations and to specialized IUCN members, aiming at discussing its conclusions in the Workshop organised by IUCN on “Mainstreaming environmental considerations in integrated river basin management in the Mediterranean region” (Málaga, April 8/9, 2002).

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<sup>1</sup> In this document, the region includes the following 23 countries : Albania, Algeria, Bosnia-Herzegovina, Croacia, Cyprus, Egypt, France, FYROM, Gaza Strip and West Bank, Greece, Israel, Italy, Jordan, Lebanon, Lybia, Malta, Morocco, Portugal, Slovenia, Spain, Syria, Tunisia and Turkey.

## 2. The Mediterranean context

### 2.1. A view of the Mediterranean

#### 2.1.1. The general Environmental context

The peoples around the Mediterranean all share the same ecosystem. However belonging to four important religions and speaking over 15 different languages (and throughout more than 30 centuries of historical conflicts and not always peaceful exchanges), all these peoples have developed common techniques to relate to their environment. A so-called "Mediterranean culture" has been shaped: from architecture to cuisine, from agriculture to water management or fishing techniques... A large array of common adaptations to a common environment are shared by peoples now integrated in over 20 different countries. Despite other differences, a concern for a common environment is alive and is not casual that the first Environmental Convention ever (BarCon 1976) was signed here to protect the Mediterranean Sea.

However, our common sea and basin are amongst the most demanded ecosystems in the world. The main environmental threats can be summarised as follows:

- ? A growing desertification, as a result of deforestation, fires and overgrazing, agricultural pressure and climate change.
- ? The mounting consumption of fresh water, mainly for agriculture, the pollution of tributary rivers and the limited recycling and sewage systems for a growing urban population, and its unsustainable *feeding-back* impact on ecosystem functions and species survival.
- ? The physical, chemical and biological pollution of this closed sea.
- ? The drop of fishing stocks and drawing back of forest areas.
- ? Economic activities in excess concentrate along the coasts, increasing demand for economic development purposes along the narrow coastal flatlands: industry, infrastructures, transport, urban development and tourist resorts.
- ? The rise of the sea level threatening the most productive ecosystems: deltas (agriculture), wetlands (fishing), beaches (tourism), and coastal groundwaters (for all purposes).
- ? As a general consequence, the irreversible loss of biodiversity inland and in the sea.

At the heart of most of these environmental threats is a weak or unexisting integrated management, including land use, and sustainable water availability, use and disposal.

Water is scarce and a declared priority for all Mediterranean countries. It is an appropriate issue for trans-Mediterranean cooperation. Water has always been subject to great pressures such as increasing consumption and decreasing availability, but it is crucial for human development and nature conservation.

#### 2.1.2. General sociopolitical aspects

Very important to consider in this context are the increasing inequalities between northern and southern countries. Almost every environmental trend mentioned above has a stronger impact in the least developed Mediterranean countries, because of a drier climate, higher dependence on basic natural resources, higher population growth and poverty rates, and lower institutional and financial capacity to face these challenges.

Human development indicators for the Mediterranean basin (UNDP, 2000) show that at least 8 countries (Cyprus, France, Greece, Israel, Italy, Malta, Slovenia and Spain) rank between the "high human development" group, i.e., above the number 30 out of 174 in the world. The rest are among the "medium human development" countries, but there are great differences between them (Croatia in number 49, Albania in number 94, Egypt in number 119, Morocco in number 124). <sup>2</sup>

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<sup>2</sup> Their per capita incomes range from \$US 16,000 to \$20,000 for the countries in the European Union and from \$3,000 to \$4,000 for developing countries.

The population growth dynamics vary enormously from some countries to other (statistically clustered in 3 homogeneous groups: Eastern / Southern / E.U. countries). Currently, in the Mediterranean basin there are about 450 million inhabitants (European Environment Agency, 2000). Their growth dynamics vary from 0 in the European area to a mean of 1.7% a year in Eastern and Southern countries. It is estimated that the population in the Eastern and Southern countries will grow from 218 million in 1990 to 360 in 2020, when it will be 2/3 of the total expected 520 million Mediterranean population (CIHEAM, 2000). As for population movements, there are 2 trends. On the one hand, in each country there is a continuous flow from inland to coastal areas. On the other hand, there is a migration flow from South and East to Northwest.

This growth and the population concentration dynamics, at a large extent influence the use of natural resources and the rates of environmental impact. Hence, there is little doubt that important limitations for the development of the least developed countries (according to the HDI) are a consequence of the difficulty to obtain enough quality resources (such as water or cultivable land) in order to increase their actual per capita gross product (CIHEAM, 2000).

The European Union guidelines have changed many landscapes in the northern countries, specially by implementing the Common Agricultural Policy. As a consequence of the economic globalisation, other Eastern and Southern countries will have to choose from alternatives such as going on as raw material producers in the agriculture or energy sectors; or fostering services such as tourism. However, in both cases they are under the influence of market pressures out of their control. In 1995, the gross product distribution per sectors and countries clearly displayed the great inequities between the different areas of the Mediterranean basin. For example, the agricultural sector was the least important in northern countries, ranging from 2% in France to 11% in Greece, while in southern countries it ranged from 11% in Tunisia to 17% in Egypt (UNEP, 2000). Agriculture claims for over 70% of all fresh water consumption in Mediterranean countries. Another effect is the moving of polluting industries from the north to the south, due to the limited environmental legislation and its increasing profitability.

## **2.2 Water and wetlands**

Water can only be managed effectively if all the uses of water within river basins, for natural ecosystems and for human use, both above and below ground, are considered as a coherent whole. For example, water-related constraints in wetlands, which are amongst the Earth's most productive ecosystems, are well documented. Wetlands largely depend on the functioning of the river basins, and in turn make part of the ecosystem resilience. In our dry environments they provide a complete and sustainable set of supplies and services (see Box 1) of economic, social and ecological importance that cannot be compared to the agricultural yields and environmental stress resulting from wetland conversion.

A wetland is part of a wider hydrological system, dependent on processes operating in the upper reaches of the basin, the downstream depending upon wetland processes for their hydrological regime and water quality. Wetlands are composed of a number of physical, chemical and biological components. Processes linking these components allow wetlands to perform important functions, such as flood control, fisheries, and their ability to retain nutrients from water (either sewage effluent and fertilizers causing eutrophication and pollution, as wetland plants and soil bacteria fix nitrates and phosphates) and to generate products (Skinner and Zalewski 1995).



## BOX 1. THE VALUE OF MEDITERRANEAN WETLANDS

**Wetland components provide many goods of great value**, including:

- **Fish:** Two thirds of the fish we eat depend upon wetlands at some stage of their life cycle
- **Wildlife:** Wildlife is exploited in a number of ways. Tourism is particularly important in many wetlands.
- **Fertile land for agriculture:** Periodic inundation of floodplains and other wetlands promotes deposit ion of fertile soils and maintains the fertility of riparian land.

In addition, wetlands provide a range of other products, including reeds for thatching and mat-making, medicines and fruits which are key to the income base of local villages.

- **Water supply:** source of water for domestic, agricultural (irrigation, livestock) or industrial use. Surface or near-surface water is a characteristic of many wetland types, such as lakes, rivers, mires and bogs, and is thus easily available for direct use.
- **Water transport:** Many communities have developed close to or actually on wetlands and use the waterways as a means of transport.

### **Functions**

- **Flood control:** The control depends on the type of wetland. Saturated river margins allow little storage, hence rainfall or upslope runoff is transferred directly to the river. These are called contributing areas and may augment river flow. In contrast, floodplains store large quantities of water during floods. This reduces the height of the flood peak and thus reduces flood risk downstream.

- **Storm Protection:** Coastal storms cause severe flooding in many parts of the world. Coastal wetlands, particularly mangroves, help to dissipate the force and lessen the damage of wind and wave action.

- **Groundwater recharge:** Many wetlands exist because their soils are impervious, thus precluding significant groundwater recharging. However, periodically inundated floodplains often have more permeable soils and groundwater recharge is recognized as an important function.

- **Sediment/pollutant retention:** Sediment is often the major pollutant in many rivers' basins. Because wetlands commonly occupy basins, they may serve as sediment settling ponds. Where reeds and grasses are present, river velocities are slowed and the opportunity for settling is increased. Because pollutants (such as heavy metals) often adhere to suspended sediment, they may be retained simultaneously with the sediment.

- **Nutrient retention:** This function occurs when nutrients, most importantly nitrogen and phosphorus, accumulate in the sub-soil or are stored in vegetation.

- **Evaporation,** is normally dismissed as being a simple loss from a wetland. Hare (1985) suggested, however, that much inland rainfall actually derives from locally evaporated water and not from moist air from the oceans.

- **Preservation,** in particular have preserved important archaeological and human remains.

Sources: Skinner and Zalewski (1995) and Barbier et al (1997))

However, historically many wetlands have been treated as wastelands and drained or otherwise degraded. Wetlands are now among the most threatened ecosystems and landscapes due mainly to drainage, land reclamation, pollution, and over-exploitation of wetlands resources.

Despite their value, the loss of wetlands is widespread. In search for agricultural soils, Mediterranean farmers have drained wetlands until the late 20th century. Partly due to this process, 50% of Mediterranean wetlands have been lost (Inst. Català de la Mediterrània, 1999). In the Middle East, 97% of wetlands have been drained to allow the development of human activities (Blue Plan, 1992). Available information indicates that approximately two thirds of all European wetlands existing at the beginning of this century have been lost (European Commission Communication 1999). In the European Union, the following wetland types have suffered from substantial loss of surface:

- rivers and floodplains have paid a heavy tribute to hydraulic protection works;
- wet meadows, flooded grasslands and temporary freshwater marshes have suffered an extensive loss due to dam building, drainage and transformation into dry pastures and arable land;
- saltmarshes have been progressively claimed for conversion into arable or industrial land;

The remaining wetlands suffer from the following types of degradation:

- excessive quantities of nitrogen and phosphorus from urban sewage and agricultural runoff often causes eutrophication;
- increasing consumption of groundwater, for irrigation and drinking, threatens to dry out many wetlands;
- the building of dams upstream may cause coastal erosion due to the lack of sediment inflow.

### BOX 2 The main functions in selected Mediterranean wetlands

|                                              |                                                                        |
|----------------------------------------------|------------------------------------------------------------------------|
| Groundwater recharge                         | Garaet Haouria (Tunisia)                                               |
| Groundwater discharge                        | La Vera (Spain), Azraq (Jordan)                                        |
| Flood storage                                | Lac Fetzara (Algeria)                                                  |
| Shoreline anchoring and reduction of erosion | Göksu River and Delta (Turkey)                                         |
| Sediment trapping                            | Sebkhet Kelbia (Tunisia), Axios Delta (Greece)                         |
| Nutrient retention/ removal                  | Tablas de Daimiel (Spain)                                              |
| Habitat for fisheries                        | Lake Kastoria (Greece), Lake Kinneret (Israel), Etang de l'Or (France) |
| Habitat for wildlife                         | Göksu Delta (Turkey), Albufera de Valencia (Spain), Camargue (France)  |
| Recreation and heritage value                | Mekhada marshes (Algeria), Camargue (France)                           |

Source: Skinner & Zalewski. (1995)

## 2.3. Watersheds and land degradation

Water management should include both its sustainable availability and its sustainable use. Its availability strongly relates to river basin management, which is based on a sound land use planning, a factor of extreme concern in the Mediterranean due to the fragile character of the land ecosystems in this region.

From a climatic point of view, we have a dry, subtropical area in which annual rainfall is distributed in an irregular way. Together with the rough coastal topography, this kind of climate causes negative consequences as frequent draughts and floods, forest fires, soil erosion, and violent run-offs and water flows on dry river beds, often used as human settlements. Most of these threats to human lives, economies and ecosystems could be minimised by an integrated water catchment policy.

A long history of human settlements, agricultural and cattle expansion on the Mediterranean river basins has led to an almost complete scenario of deforestation, fueled by firewood gathering, extensive cattle and forest fires. Today, the main threats against the remaining forest areas in southern and eastern countries is their over-exploitation for firewood and grazing needs. For example in Morocco, the forest area lost every year amounts to 31,000 ha. Should this situation prevail, desertification could be irreversible in 30-50 years. In northern countries forest fires are the main cause of forest loss (an average 1% of Mediterranean woods, around 450,000 ha, are burnt every year in an average on 60,000 fires, WWF 2000), the second threat being the replacement of these ecosystems for urbanization (UNEP, Blue Plan, 1992).

The impact of this situation in terrestrial biodiversity is severe, and the preservation of such fragile land ecosystems is very inconsistent: while 20% of all Mediterranean species are threatened, only 5% of the vegetation cover is protected (WWF, 2000). The figure drops to less than a 1% of protected vegetation cover as related to country extension, which, together with an extended lack of land use ordination policies and planning, presents a weak prospect for sustainable water catchment in the region (\*).

**FIGURE 1: FOREST AREA, PROTECTED AREA AND % OUT OF TOTAL FOREST AREA**

| Countries         | Total area sq. km | Protected area sq. Km | %    |
|-------------------|-------------------|-----------------------|------|
| Spain             | 140,236           | 15,198                | 10.8 |
| France            | 108,306           | 14,817                | 13.7 |
| Italy             | 67,573            | 4,130                 | 6.1  |
| Greece            | 44,225            | 754                   | 1.7  |
| Bosnia-Herzegovin | 23,027            | 226                   | 1.0  |
| Slovenia          | 6,957             | 617                   | 8.9  |
| Croatia           | 13,913            | 1,373                 | 9.9  |

|         |        |       |      |
|---------|--------|-------|------|
| Albania | 10,660 | 127   | 1.2  |
| Cyprus  | 1,396  | 466   | 33.4 |
| Morocco | 18,621 | 490   | 2.6  |
| Algeria | 26,946 | 991   | 3.7  |
| Tunisia | 3,005  | 67    | 2.2  |
| Libya   | 526    | 0     | 0.0  |
| Egypt   | 1,380  | 0     | 0.0  |
| Lebanon | 358    | 0     | 0.0  |
| Syria   | 471    | 0     | 0.0  |
| Turkey  | 83,898 | 1,012 | 1.2  |

Source: WCMC, Blue Plan, 1999

### Soils and agriculture

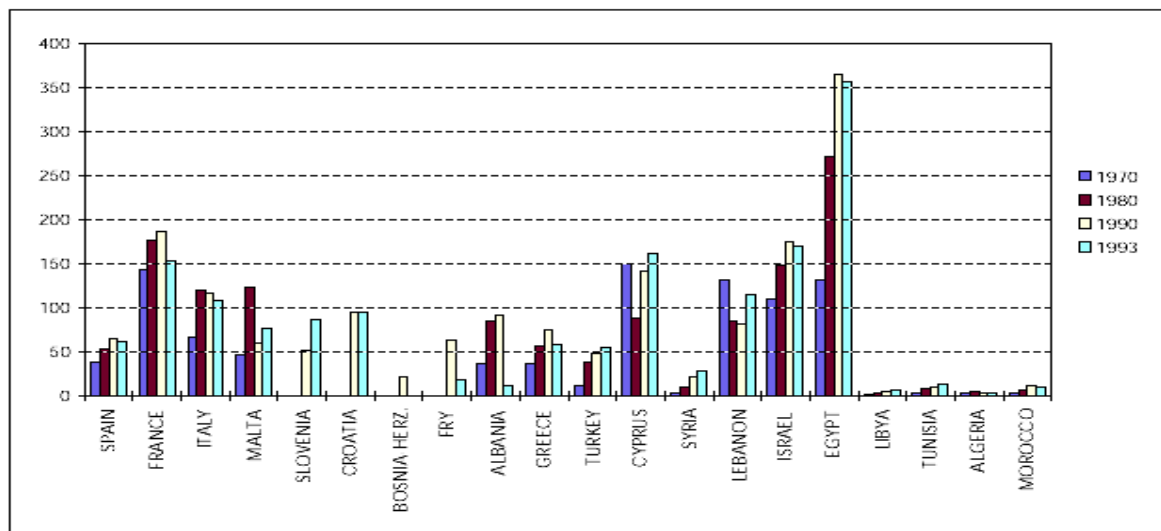
In general, the Mediterranean basin does not have wide fertile plains, as a consequence of its orography. Optimal conditions for productive agriculture are only present in intermountain valleys, as well as in the greatest tributary rivers of the basin (Ebro, Rhone, Po and Nile).

Except in these few cases, the Mediterranean peoples had to cut down woods and colonise hillsides to spread their agriculture. The way the Mediterranean civilisations have searched for agricultural space and used it throughout their history (Hillel, 1991) allows for a better understanding of the terrestrial situation, the lack of woods and the advance of desertification.

Overgrazing harmed soils, destroyed the vegetable layer and prevented its regeneration. In Tunisia, for example, the current fertile land area is estimated in 3,800,000 ha, although the farming land area is slightly larger (4,781,000 Ha). So almost 1 million ha of farming land is on marginal areas, 60% of it in an arid environment prone to desertification (Ministry of the Environment and Territory Management of Tunisia, 1998).

Soil degradation processes have mounted after the introduction of an increasingly technified agriculture that has entailed the consolidation of welfare society in the north, whereas it has meant just food security for southern and eastern countries. The use of fertilisers (see Figure 2) was in 1993 over 350 kg/ha in Egypt, 150 in Israel, France and Cyprus and 100 in Spain, Italy and Lebanon (World Bank, 1996). These values show a source of environmental threats and also confirm the historic sequence described above. The use of fertilizers also worsens the salinisation of soils.

**FIGURE 2: FERTILIZER CONSUMPTION IN MEDITERRANEAN COUNTRIES FROM 1970 TO 1993 (KG/HA)**



Source: World Bank. Social Indicators of Development 1996

### Desertification and Climate Change

In December 2000, the Secretariat of the Convention to Combat Desertification (CCD) stated "the magnitude of this problem is outstanding, because it has an effect on 1/4 of the terrestrial area: about 3,600 million ha are suffering from the effects of this process, particularly in developing countries. Furthermore, 6 million ha of the most productive land are lost every year since 1990 because of land degradation..."

In the Mediterranean, a large part of the population lives in arid areas that can become deserts: up to 78% in Morocco and Tunisia (Ferchichi, 2000). Other southern Mediterranean countries have very high rates of desertification and desertification risk; 90% of Libya is desertified, the remaining 10% is in danger of desertification. In the East, according to Akrimi (2000) Syria has the lowest rate of desertification, only 9.9% of the land is desertified, although 58.8% is in danger. Some northern countries like Spain are also threatened with desertification; in this country, during the 1990s approximately 150,000 forest fires, 92% started by people (a figure which is 99% in Italy) have caused the disappearance of more than 1.3 million ha of forests (Inst. Català de la Mediterrània, 1999). The soil loss ranges from 5 to 50 ton/ha and year (Blue Planet), specially in the south.

Climate change may have particularly serious consequences in the Mediterranean, through more frequent draughts, claiming more water for irrigation and nature, forest fires adding CO<sub>2</sub> to the atmosphere, stronger storms and floods causing erosion, and the expected rise of the sea level. The latter may further reduce freshwater availability on coastal areas, as salt water intrudes the phreatic layer, a serious problem already taking place in areas with a high water demand (as tourist coasts and islands, eg in Catalonia and the Balearics). On the other hand the temperature rise will increase evaporation and evapotranspiration rates, demanding more irrigation.

### The importance of river basins

Water resources require vigilant protection, so ecosystems from which water flows should be protected or wisely managed. In mountain regions, where most rain falls, soils and vegetation, often combined with aquifers, store water, and further downstream, wetlands can act as flood control and filters for pollution, again helping to safeguard supplies (Pearce 1996). As this author states, freshwater, because it is essential to life on Earth, and because it flows through ecosystems and interacts freely with land, atmosphere and oceans, requires integrated management more than any other resource. River basins must be seen as a whole, with headwater activities in harmony with downstream needs. Actually, a river with stable soils and trees in its watershed and secure aquifers and wetlands in its floodplain will be more likely to flow right through the year and during draughts.

Special concern should be given to Mediterranean islands. In our region there are over four thousand islands belonging to eight countries, hosting a population of 11 million inhabitants, and containing a large part of the outstanding 15,000 plant and vertebrate endemisms in the region. These islands make approximately 6% of the total Mediterranean watersheds. Water is among the main limiting factors for islands development and conservation.

## **2.4. Water demand and uses**

In our region water is scarce, yet its demand is rising. It is also important to consider how un-evenly distributed this resource is, both in time and space, a fact that is creating additional challenges.

### **2.4.1. Water is scarce**

In the past, some Mediterranean cultures developed advanced water management techniques. As an example, around the year 5000 BC Egyptians used artificial irrigation systems by means of dikes along the Nile. In Petra (Jordan), the Nabateans practised the so-called surface runoff exploitation technique for human use and agriculture. In this way, they abstracted the surface waters coming from the scarce winter rainfall (100 mm) in the desert. This inheritance was taken by the Arabs, who recovered and developed new technologies for rational water management and spread them into southern Europe (Negev 1979).

In contrast to the rational use of this resource, the situation has been worsening in present times due to the intensification of irrigation farming, the rise of the industrial activity, and the population growth.

The level of exploitation of water resources is generally high in most countries and pressure over water resources is increasing. Exploitation ratios are over 50%, or even nearing 100% in many parts of

Mediterranean countries (Egypt, Palestinian Authority, Israel, Libya, Malta, Tunisia, most Islands and the Eastern regions of Spain). Exploitable amounts of water are decreasing, and may become scarce in time or region. Disruptions between water demand and renewable conventional supply are increasing. Over exploitation of local character is a reality leading to widespread salt-water intrusion (Medtac, 2000). In the Mediterranean the average increase in water demand has been 60% for the last 25 years.

**FIGURE 3 Exploitation index of natural and renewable water resources (years 90-97)**  
(in bold, 4 countries close or over renewable rates)

| Countries          | % exploitation index of water | Countries     | % exploitation index of water |
|--------------------|-------------------------------|---------------|-------------------------------|
| Spain              | 33                            | France        | 21                            |
| Italy              | 23                            | Greece        | 10                            |
| Bosnia-Herzegovina | -                             | Yugoslavia    | -                             |
| Slovenia           | 2                             | Croatia       | 1                             |
| Albania            | 3                             | Malta         | 50                            |
| Chipre             | 27                            | Morocco       | 41                            |
| Algeria            | 25                            | Tunisia       | 57                            |
| <b>Lybia</b>       | <b>103</b>                    | <b>Egypt</b>  | <b>91</b>                     |
| Lebanon            | 27                            | <b>Gaza</b>   | <b>208</b>                    |
| Syria              | 48                            | <b>Israel</b> | <b>95</b>                     |
| Turkey             | 15                            |               |                               |

Source: Blue Plan, 1999

By sub-regions, the availability of renewable water resources is of 72% in northern, 23% in eastern, and 5% in southern Mediterranean countries. In countries like Libya, 87% of the water used comes from non-renewable fossil aquifers in the Sahara (UNEP, Blue Plan, 1999), while Egypt already has 100% dependence on water resources originating in other countries.

Regardless of its shrinking availability, demand for water in the Mediterranean is in constant demand. Currently, agriculture activities entail 72% of the water consumption in the Mediterranean basin (84% in southern and eastern countries), whereas the industrial sector uses 17% and only 10% is used for domestic reasons (Agenda 2000).

## **2.4.2 Water is unevenly distributed**

The timing of Mediterranean rainfall doesn't usually coincide with the time of the major demand in summer period (agriculture and tourism). That brings the need for storage infrastructure. Rainfall in the northern regions reaches 900 mm, whereas in the southern arid regions it barely meets 100 mm. But what is most particular about our region is that over 80% of the yearly precipitation occurs between September and March. The seasonal contrast is most pronounced in the south and east of the region, where most of the annual rainfall may come in a few days of torrential downpours. In parts of southern Tunisia, as much as 60 % may fall on a single day.

The seasonal variability also forces local people and towns to use groundwater resources and fossil waters with a growing intensity. The overuse of groundwater puts a heavy toll on our remaining wetlands, as well as in coastal areas running the risk of marine incursions that destroy the usefulness of the aquifer, a process difficult to reverse (eg Cap Bon, Tunisia, Gaza strip, Palestine). In the Mediterranean many wetlands become temporarily dry. Prolonged dry periods of three to five years may also occur, resulting in many shallow lagoons and floodplains remaining desiccated for long periods. In such stressing situations, the conservation of aquatic and semi-aquatic species of fauna and flora need a wide range of alternative wetlands available. For these reasons wetlands should not be considered in isolation but as forming a global interconnecting network, often between distant areas, in the same basin or in other.

Within an individual country, rainfall in different basins may vary between 200 and 800 mm, moving governments to place enormous investments in storing water and transferring it to other parts of the country (e.g. transfer from North Tunisia to Cap Bon, the Spanish National Hydrologic Plan, the tunnels in Anatolia, and other).

In trying to solve these mounting problems, many rivers have been dammed. Dams usually receive support from irrigators and from urban populations. But this has caused other new and significant problems, mainly by fragmenting river ecosystems, threatening and in many cases completely stopping the minimum ecological water flows during the long dry period, increasing evaporation, and making storing capacity reduce due to siltation; coastal fisheries also shrink as nutrients are held back in dams, while coastlines slowly erode and river deltas sink (50 years life expected to the Ebro river delta) because of lacking sediments. These undesirable effects are expected to become more serious as climate change causes higher erosion in watersheds and higher sea levels on the coast.

### 2.4.3 Dams

As a consequence of the uneven distribution of water, dams have been built to capture water in the wet season and storing it to be used during the long, hot summer when demand is higher. To date dams have produced many positive results for human development, although their functionality and the impact on ecosystems show that this solution is expensive and unsustainable. Between the main functions of dams in the Mediterranean (Table 4), are the irrigation and energy production, or both. In general, in drier countries the main function is irrigation (e.g. in Algeria, Egypt, Libya, Morocco).

**Table n°4 Dams and their functions in Mediterranean countries**

| Country    | Number of Dams | Irrigation % | Energy % | Flood Control % | Water Supply % | Other Use % |
|------------|----------------|--------------|----------|-----------------|----------------|-------------|
| Albania    | 306            | 98           | 2        | 0.3             | 0.7            | 0.7         |
| Algeria    | 107            | 91           | 2        | 0.9             | 25             | 0.9         |
| Bosnia     | 25             | 20           | 56       | 20              | 12             | 20          |
| Croatia    | 29             | 10           | 66       | 66              | 10             | 3           |
| Cyprus     | 52             | 96           | 0        | 0               | 0              | 19          |
| Egypt      | 6              | 100          | 50       | 17              | 0              | 67          |
| France     | 569            | 19           | 54       | 8               | 22             | 26          |
| Greece     | 46             | 48           | 50       | 0               | 15             | 0.9         |
| Italy      | 524            | 32           | 60       | 3               | 21             | 0           |
| Lebanon    | 5              | 40           | 100      | 0               | 0              | 0           |
| Libya      | 12             | 83           | 0        | 83              | 8              | 0           |
| Morocco    | 92             | 67           | 22       | 15              | 37             | 37          |
| Portugal   | 103            | 49           | 54       | 1               | 40             | 6           |
| Slovenia   | 30             | 10           | 60       | 30              | 0              | 37          |
| Spain      | 1187           | 51           | 32       | 2               | 35             | 7           |
| Syria      | 41             | 66           | 7        | 2               | 15             | 5           |
| Tunisia    | 71             | 92           | 0        | 3               | 4              | 31          |
| Turkey     | 625            | 88           | 9        | 11              | 10             | 1           |
| Yugoslavia | 69             | 16           | 36       | 1               | 45             | 3           |

\* The sum of percentages is not necessary 100% because some dams have multiple uses.

\* Other use includes: fish farming, Recreation and others.

Source: World register of Dams, 1998

Today, surface water collected behind dams is the prime source of water supply in most of the Mediterranean countries (Italy, Spain, Turkey, Lebanon, Egypt and the Maghreb).

Almost all important rivers in the Mediterranean have been dammed, for example, the Rhône, in France has 48 hydroelectric dams, The river Guadalquivir, in Spain, has 30 dams. The island of Sardinia (Italy), has 35 reservoirs, the highest density in the Mediterranean.

In many nations, big dams and reservoirs were originally considered vital for national security, economic prosperity and agricultural survival. Until the late 1970s and early 1980s, few people took into account the environmental consequences of these massive projects. In past decades, and actually for generations, engineers have considered that pouring water into a wetland or the sea was a waste. Today, however, the experience from dams shows that these mega-structures have often damaged the ecosystems in and around countless rivers, lakes and streams. A handful of countries are even taking steps to remove some of the most egregious and damaging dams, eg. France or the USA, where altogether around 500 old, dangerous or environmentally harmful dams have been removed in the past few years (Gleick 2001).

Dams create problems in coastal areas as well, as they result in a reduction of the amount of freshwater and precious sediments reaching their deltas. Also the evaporation is very high in our region. Most importantly, the amount of sediment carried in the Nile (and the Ebro) has been reduced by over 95%; for the Po the reduction is about 75% and for the Rhône about 50%. The building of dams have caused a drastic change in the natural cycle of sediment delivery and deposition in the deltas. All this sediment is creating new deltas at the entrance of the water reservoirs, causing a new problem. In Morocco, 8% of the total reservoir capacity (800 million m<sup>3</sup>) has been lost to siltation by 1990; in Algeria this figure is of 11%, and predicted to rise to 24% by 2010. A study of Tunisian reservoirs found that silt reduces their capacity by 1 to 2.5 % a year (Pearce 1996).

The fast erosion of river deltas (as much as 100 m a year in some parts of the Nile delta) is not the only impact. Also the fisheries loose their vital source of annual fertilization due to the reduction of the river's annual flood-load of rich silt. Also freshwater fish suffer from habitat fragmentation by dams in rivers; Gleick (2000) states that over 20% of all freshwater fish species are threatened or endangered by dams, as they may bar the path of migrating fish such as trouts and sturgeon to spawning sites upstream, alter river water temperature, chemical characteristics and flood cycles that are essential to the life cycles of plants and animals downstream. However, sometimes the dams have also beneficial effects in wildlife by providing a habitat for waterbirds, or replenishing groundwater.

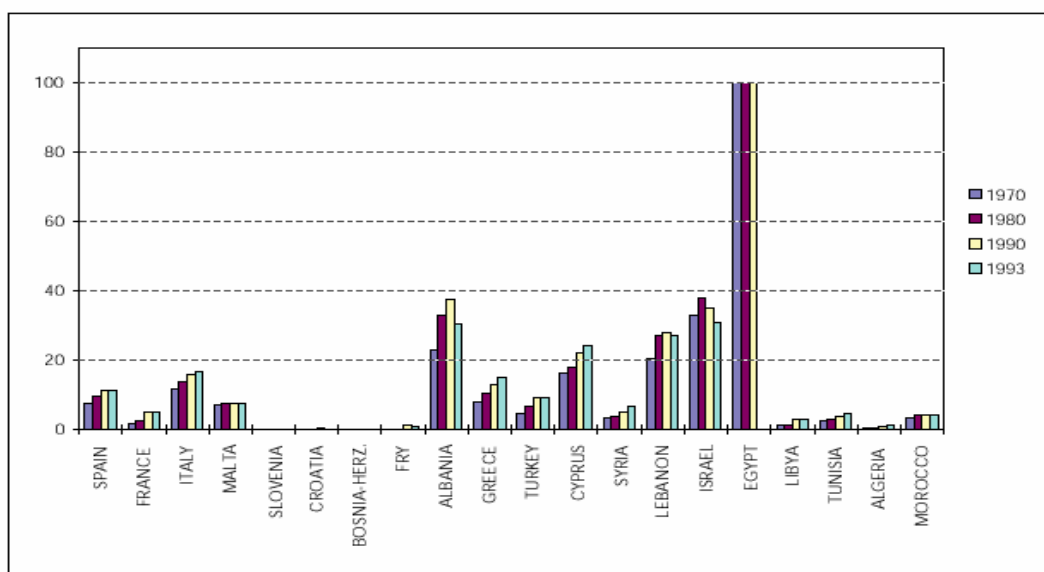
The *Report of the World Commission on Dams – Dams and Development*- published in 2000, examines the controversial issues associated with dams and shows a way to improve the planning, construction and operations of dams and other water and energy infrastructures. UICN has decided to collaborate in implementing strategies to avoid or mitigate the impacts of dams on biodiversity and livelihoods, and to apply the lessons learned to reduce such problems in the future.

#### 2.4.4 Agriculture and irrigation

Even in industrialized countries, irrigation often dominates water use (Spain 70%, Italy 57%, Greece 89%). It only drops below half in France (13%) and former Yugoslavia (5%)

Irrigation is the greatest water consumer but also, by extension, the activity where water saving could be greater and easier. New irrigation programmes are still launched, although their growth has flattened and programmes slowly tend to an increasing rationalisation in existing irrigation facilities, such as drip irrigation. However, in most regions few if any steps have been taken to change towards less water demanding crops, such as the traditional mediterranean crops (olive, vines or wheat). In southern European countries this is mostly due to heavily subsidised agriculture, and throughout the region there is little incentive for change as the price of water does not include its real economic costs, let alone its environmental costs.

**FIGURE 5: EXTENSION OF IRRIGATED LAND IN COUNTRIES OF THE MEDITERRANEAN BASIN (% AGRICULTURE LAND)**



Source: World Bank, Social Indicators of Development, 1996

Besides the excessive consumption of water, the generalisation of irrigation has other, more irreversible effects: the degradation of the most fertile soils and particularly their salinisation (in Maghreb countries alone, it is estimated that more than 100,000 ha of cultivable land is lost every year), besides the accumulation of chemical fertilising elements in soil or in waters (Table 6). Certain irrigation practices degrade soil quality and reduce agricultural productivity, heralding a premature end to the green revolution started in the 1950s.

**TABLE 6: SOIL EROSION AND DISPOSAL OF PHOSPHORUS (P), NITROGEN (N) AND ORGANIC CARBON TO THE MEDITERRANEAN SEA COMING FROM FARMING LANDS.**

| Country | Drainage area (km <sup>2</sup> ) | Soil 10 <sup>6</sup> t | Total P 10 <sup>3</sup> t | Total N 10 <sup>3</sup> t | Total Org. C 10 <sup>3</sup> t | Estimate soil loss per year (t/ha) |
|---------|----------------------------------|------------------------|---------------------------|---------------------------|--------------------------------|------------------------------------|
| Albania | 30,400                           | 6.8                    | 3.7                       | 6.7                       | 74.1                           | 2.24                               |
| Algeria | 99,100                           | 55.8                   | 15.9                      | 41.4                      | 387.6                          | 5.3                                |
| Cyprus  | 9,100                            | 14.1                   | 6.9                       | 20.3                      | 161.1                          | 15.49                              |
| France  | 130,000                          | 38.2                   | 25.6                      | 51.7                      | 565.0                          | 2.94                               |
| Greece  | 106,100                          | 207.5                  | 146.7                     | 268.7                     | 2,492.3                        | 19.56                              |
| Israel  | 10,300                           | 3.8                    | 1.3                       | 3.2                       | 33.0                           | 3.69                               |
| Italy   | 279,300                          | 410                    | 341.7                     | 619.4                     | 6574.4                         | 80.13                              |
| Lebanon | 7,800                            | 25.7                   | 6.5                       | 17.4                      | 196.4                          | 32.95                              |
| Morocco | 62,800                           | 43.7                   | 9.1                       | 29.7                      | 502.0                          | 6.96                               |
| Spain   | 180,300                          | 116.1                  | 103.1                     | 177.3                     | 1,801.1                        | 6.44                               |
| Syria   | 5,700                            | 34.0                   | 14.8                      | 27.4                      | 267.9                          | 59.65                              |
| Tunisia | 34,400                           | 54.9                   | 28.7                      | 56.5                      | 571.0                          | 15.96                              |
| Turkey  | 153,700                          | 296.9                  | 129                       | 250.9                     | 3,315.0                        | 19.32                              |

Source: UNEP/Mediterranean Action Plan, 1997.

In Southern and Eastern countries, there are 16 million hectares of salinised lands. In Egypt, 100% of the farming lands is under threat (Akrimi, 2000). And salinisation problems are worsened by the excessive use of fertilisers (see Fig.2).

Leak and theft of water are a constant in many water-supply systems. As Pearce (1996) shows, most countries have only a vague idea of how much water is lost in this way. Few have installed the complex systems necessary to monitor the flow of water through pipes. Moreover, leakages tend to worsen as systems age and pipes crack. Leaks and theft probably account for over 30% of the freshwater use in the Mediterranean.

Farmers are the main consumers of water. It is traditionally thought that their only concern is the demand for water (the quantity of available water). In spite of this, they are very concerned by the increase in the salinity level of water and soil. The hardest part of the process is often the attempt to provide every irrigator with useful information, since in many places they do not have strong and effective associations of irrigators.

#### **2.4.5 Other water-use related situations**

Another problem related to this subject is the drinking water scarcity, as a consequence of its pollution, for example in Albania. The general overview in Table 7 shows the worsening conditions of access to secure drinkable water in eastern and southern countries like Albania, Egypt or Lebanon.

**TABLE7: % POPULATION WITHOUT ACCESS TO DRINKING WATER IN THE MEDITERRANEAN COUNTRIES**

| Countries | Year 1975 | Year 1985 | Year 1995 |
|-----------|-----------|-----------|-----------|
| Spain     | ---       | 1         | ---       |
| France    | ---       | 2         | 0         |
| Italy     | ---       | 1         | ---       |
| Greece    | 35        | 15        | ---       |
| Monaco    | ---       | 0         | 0         |
| Slovenia  | ---       | ---       | 2         |
| Croatia   | 30        | 37        |           |
| Albania   | ---       | 8         | 24        |
| Malta     | ---       | 1         | 0         |



|         |     |    |     |
|---------|-----|----|-----|
| Morocco | 49  | 43 | 43  |
| Algeria | --- | 23 | --- |
| Tunisia | 51  | 11 | 10  |
| Libya   | 42  | 10 | 5   |
| Egypt   | 7   | 10 | 16  |
| Israel  | --- | 0  | 1   |
| Lebanon | 8   | 2  | 6   |
| Syria   | 29  | 29 | 12  |
| Turkey  | 32  | 31 | --- |
| Cyprus  | 5   | 0  | 0   |

Source: World Bank, Blue Plan, 1999

In most developed countries the population growth is low, and the *per capita* water consumption for human use unexpected to increase in the near future. Nonetheless, the volume of available drinking water may reduce due to the pollution produced by intensive agriculture and industrial activities. Furthermore, salinisation of groundwater is expected to increase due to the rise of sea level as an effect of climate change.

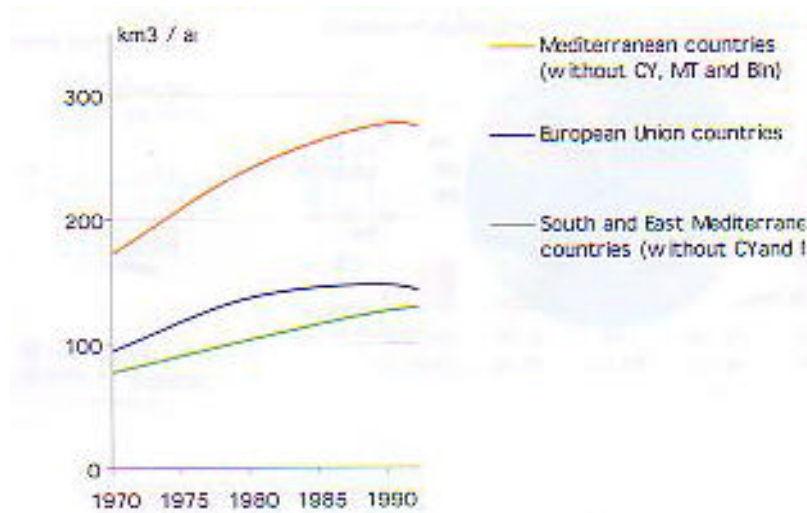
There are other economic activities requiring large freshwater supply. One of them is tourism. For example, the use of water of one tourist is 800 l/day, as opposed to 70 l/day of a resident (WWF, 1995). The Mediterranean is the main touristic destination in the world. It receives 175 million visitors per year (OMT, 1998), i.e. 30% of the international arrivals and 1/3 of the worldwide income for this sector. Nowadays, tourism is the main currency source in the Mediterranean region, and it represents an average 7% of the GDP (and up to 24% in Malta and 22% in Cyprus ) (EEA 2000). If the current forecasts pointing out a 2.8% yearly increase in the next 20 years are correct, it is estimated that 332 million people will visit the Mediterranean coast in 2020 (WWF, 2000). Other scenarios show that 350 million people could visit it in 2025 (Blue Plan, 1995). Such a high number of visitors, and their seasonality (80% among the seven drier months of the year) has a great impact on water resources in islands and coastal areas.

**TABLE 8: SUB-REGIONAL DISTRIBUTION OF WATER WITHDRAWAL**

| Region               | Water withdrawal by sector |            |              |            |              |            |              | % by region (1993) | m³/year per inhabitant |
|----------------------|----------------------------|------------|--------------|------------|--------------|------------|--------------|--------------------|------------------------|
|                      | Agricultural               |            | domestic     |            | Industrial   |            | total        |                    |                        |
|                      | km³ per year               | % of total | km³ per year | % of total | km³ per year | % of total | km³ per year |                    |                        |
| Maghreb              | 21.1                       | 85         | 2.5          | 10         | 1.2          | 5          | 24.8         | 4.8                | 363                    |
| North-eastern Africa | 65.0                       | 88         | 3.9          | 5          | 4.8          | 7          | 73.7         | 14.4               | 764                    |
| Middle East          | 77.7                       | 85         | 7.7          | 8          | 6.0          | 7          | 91.4         | 17.8               | 907                    |
| Total Subregion      | 163.8                      |            | 14.1         |            | 12.0         |            | 189.9        | 100.0              |                        |
| World 1990           | 2 235.6                    | 69         | 259.2        | 8          | 745.2        | 23         | 3 240.0      |                    | 660                    |

Source: Aquastat, FAO-AGL, 2001

**FIGURE 9: TOTAL WATER WITHDRAWALS (renewable and non renewable) evolution in country groups.**



Source: Blue Plan.

#### **2.4.6 .Water quality**

A sharp rise in the industrial use of water is expected in the Mediterranean basin. But if we take as a reference the percentages representing industrial consumption in the richest Mediterranean countries, it does not even reach 5% of the total. However, even though this volume of water demand is not great, the pollution caused by industry is sometimes serious. And even though it seems that the principle that the polluter should pay is globally being established, it is also true that the cost is often not deterrent and therefore it becomes only one more production cost.

The last UE report on freshwater quality in inland recreation-swimming areas (UE 2002) states that pollution increases and in 2001, 48 inland swimming areas had to be closed (19 belong to Spain), a 1.1 % of all EU areas in just one year.

Around 500 rivers flow into the Mediterranean. Some of them, e.g. the Ebro, the Rhone, the Po or the Nile, carry pollutants from land-based sources (mostly industry and agriculture), in total up to 80% of all pollution sources into the Mediterranean sea (Mediterranean Action Plan 1995). It is estimated that 500,000 m<sup>3</sup> of solid waste are dumped every year without control or depuration. Soils suffer from polluting processes too, especially in eastern and northern countries. One of the most outstanding factors is the effect of industrial waste. For example, in Bosnia and Herzegovina there are 300,000 ha of land polluted by heavy metals. In Lebanon, many types of waste are dumped on road margins as well as in irrigation channels, which affects soils, waters and irrigation systems.

#### **2.4.7. Transboundary issues**

The whole scenario may be complicated by the fact that water has been the prize of conflicts in many parts of the world, and particularly around the Mediterranean..

In the Mediterranean basin water resources are often shared by different countries, as political boundaries do not always follow hydrological boundaries; instead, national boundaries sometimes run down the middle of rivers, as on the Danube or Neretva; or maybe rivers flow from one country to the other as the Jordan, Tagus, Douro, Rhone or Nile. This is the case of Egypt (100%), Syria (80%) or Israel (55%). The most representative example is the Jordan basin which is shared by five countries: Jordan, Israel, Palestinian Authority, Syria and Lebanon.

Experts in the Global Water Summit Initiative have estimated that "Israel, the West Bank, Gaza and Jordan are facing a combined water deficit of at least 300-400 million m<sup>3</sup> per year". Despite the efforts for water-use efficiency, today Israel still uses three times as much water *per capita* than Jordan and ten times as much as Gaza. Underground aquifers also frequently cross national boundaries, and the potential for conflict is even greater here, e.g. the great fossil-water aquifers beneath the Sahara.

#### **2.4.8. General remarks**

Water must now be regarded as a limited and scarce resource that must be shared in the context of policies for nature conservation and protection of other features of the water cycle. Not all of nature's water can be corralled for human use. The complex interchanges within a river basin -between rivers and groundwater and wetlands- must be respected. As Pearce (1996) states “while short-term costs are readily appreciated, ecological requirements are less easy to quantify. So too is the long-term impact on sustainability, through the destruction of natural water stores such as wells and aquifers”

Rather than trying endlessly to find enough water to meet hazy projections of future desires, it is time to find a way to meet our present and future needs with the water that is already available, while preserving the ecological cycles that are so integral to human well-being.

The following Table 10 from MEDTAC (2000) summarizes the environmental situation of the Mediterranean region and presents some possible issues.

**TABLE 10: Summary of some key sustainability issues in different subregions of the Mediterranean**

|                                | LEVEL OF<br>EXPLOITATION OF<br>WATER RESOURCES<br>AND TRENDS                                                                                                                                                                                                           | ROLE OF<br>AGRICULTURE                                                                                                                                                                                                                       | WATER QUALITY<br>AND ECOSYSTEMS                                                                                                                                                                                                                               | WATER DEMAND<br>MEASURES                                                                                                                                                                                                                                                                                      | DESALINATION AND<br>WASTEWATER                                                                                                                                                                                                                           | INSTITUTION AND<br>LEGAL SYSTEM                                                                                                                                                                                                                                                      | REALLOCATION<br>ISSUES                                                                                                                                                                                     | OTHER ISSUES                                                                                                                                                                                           |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>North<br/>Africa</i>        | High level of exploitation and overabstraction of groundwater leading to salt-water intrusion. Major deficits of drinking water supply in rural areas of some countries (e.g. Morocco, Egypt)                                                                          | Important contributor to GDP in most countries. Provides high levels of employment. Expansion of irrigated areas is in the agenda. Modernisation is needed                                                                                   | Little information. Increasing concern                                                                                                                                                                                                                        | Not widely applied. Problems with the implementation of price schemes. Tunisia has got examples of successful water demand management.                                                                                                                                                                        | Still a small contributor to total water supply. Desalination is being used in Tunisia, Egypt and Libya.                                                                                                                                                 | The institutional legal Framework for IWRM is in place in many countries. Improvement in the efficiency of some institutions is needed. Need for effective enforcement of the law and regulations                                                                                    | Water savings in agriculture could be reallocated in other areas where there is competition for the resource.                                                                                              | A key challenge is the <i>effective functioning</i> of the water services in urban areas. Need for educational, institutional and financial support. Strong state budget deficit control is a reality. |
| <i>Islands</i>                 | Full exploitation and overabstraction of groundwater. Some islands depend on transported water at high prices and suffer from shortages.                                                                                                                               | The importance varies with size of Island. Little reduction of water allocated to irrigation. Technical improvements are being put in place for some years.                                                                                  | Little information. Increasing concern                                                                                                                                                                                                                        | Implemented in some islands (Cyprus). Problems with the implementation of price schemes. Successful combination of incentives (economic, legal, education)                                                                                                                                                    | It is becoming a major option for most islands, as Cyprus and Malta.                                                                                                                                                                                     | Fragmentation of the Institutional framework common even in places where IWRM institutions are in place. Problems of legal Indefinition. User rights not clearly defined in some cases                                                                                               | Resizing the agriculture sector is in the agenda. More stringent water prices. More information and advice about risks is <i>necessary</i>                                                                 | Need for increased coordination of institutions. Need for effective integration of stakeholders and water users.                                                                                       |
| <i>North<br/>Mediterranean</i> | No overexploitation, except in East Spain and South Italy. Overinvestments and Expensive solutions for water supply would need to be avoided. South Europe countries face shortages in coastal areas, aggravated by the affluence of tourists and irrigation practices | Agriculture is not a large contributor to GDP but responsible of high consumption of water in South European countries (Spain, Italy, Greece and Turkey). The other countries do not use largely irrigation. It is now increasing in France. | They come mainly from the lack of adequate <i>wastewater treatment</i> , threatening underground and surface water <b>resources</b> and marine ecosystems, as well as wetlands. In water scarce areas quantitative impacts are an issue.                      | South European countries use economic instruments including conservation prices and markets. The rest are making slow progress thanks to the increase of water prices. Very often, population is totally unaware of high water losses.                                                                        | Wastewater treatment is insufficient in most countries (except France and Italy, Spain and Greece Improving fast), causing harm to ecosystems and Ground and surface water.                                                                              | Institutional framework is Fragmented. Coordination mechanisms are insufficient and too Complex. IWRM exists in most countries but in Balkans need long term management plans and strong financial support. <i>Effective integration</i> of coastal areas management is also missing | Resize agriculture, using its water savings for redistribution to other sectors is economically, socially and environmentally more <i>feasible</i> than in other regions. Markets are starting to be used. | Risk Planning is not sufficiently <i>developed</i> , particularly related to floods and droughts.                                                                                                      |
| <i>East<br/>Mediterranean</i>  | High level of overexploitation of groundwater due to severe shortage of rainfall in many areas. High seasonal and interannual variations worsen the problem.                                                                                                           | Small to <i>moderate role</i> of agriculture in the region GDP but agriculture is the main consumer of water. Important water losses in irrigation                                                                                           | Decreasing quality of water as a result of industrial discharge and insufficient water treatment mechanisms. Problem of salinisation of surface water. Lack of adequate monitoring to measure the loss of quality. Quantitative impacts are being considered. | Water conservation pricing structures, promotion of water saving technologies, public awareness. Campaigns on the importance of saving water and programmes for reduction of losses in distribution are being implemented or are in the agenda of some countries. Some good practice experience in the region | Wastewater reuse implemented in the Subregion. Desalination plants are widely used in Israel and considered in other countries. Potential of Wastewater reuse and substitutions of good quality water is increasing with increased Wastewater treatment. | There is a variety of organisations involved in planning, regulation, delivery, etc in many countries. Co-ordination mechanisms efficient in some of them. Need to reinforce regulatory functions and enforcement of standards. Some good practice experience in the Region          | Water savings use for reallocation of water. System of water periodically revised of water quotas in Israel. No permanent Water Rights.                                                                    | River basins and aquifers are shared by more than one country creating conflicts of interest. High population growth in the area will affect water availability in the future.                         |

Source: Framework for action for the Mediterranean, MEDTAC 2000

### 3. Achieving sustainable water use

In Mediterranean countries water is massively diverted for human use, creating a growing concern about the damage to the ecological functions of water within rivers and wetlands, and about the risks to future water resources being created by current overuse.

We can see in Table 10 (Medtac 2000) a summary of the key sustainability issues related to water management in different sub-regions of the Mediterranean. The information about impacts on nature and ecosystems is still very scarce. However, the situation in countries with more information (e.g. the Northern countries) is already a matter of concern: growing erosion and desertification, loss of wetlands, salinization, rivers are fragmented and minimum ecological flows not guaranteed, there is severe water pollution, and insufficient information and monitoring. The situation in Eastern and Southern Mediterranean countries, with a drier climate, generally weaker legal and administrative frameworks and growing demographic patterns, is still more pressing.

#### 3.1. Water offer and infrastructures

Even the century ahead, with impressive gains in technological capabilities to find, transport and conserve freshwater, may not be able to accommodate increasing demand.

Water demand is not usually focused through water saving but through increased offer. Most water-supply policies in the region remain geared primarily by conventional solutions to water shortages. Algeria plans over 50 dams and 10 diversion canals, Morocco intends to double the proportion of its river flow that is controlled by dams, and will build 60 large dams and 280 kms of water-transfer structures; Spain's PHN plans to build over 100 dams in the next few years.

This methods of water supply and transfer are now a major element in many national budgets, and costs are likely to increase as remaining water sources lie furthest from where they are needed, and the easiest sources, and best dam sites have already been developed. Increasingly, water transfers move water between catchments, creating another set of ecological problems, as river beds and wetlands run dry, and ecosystems may be upset by new species invading.

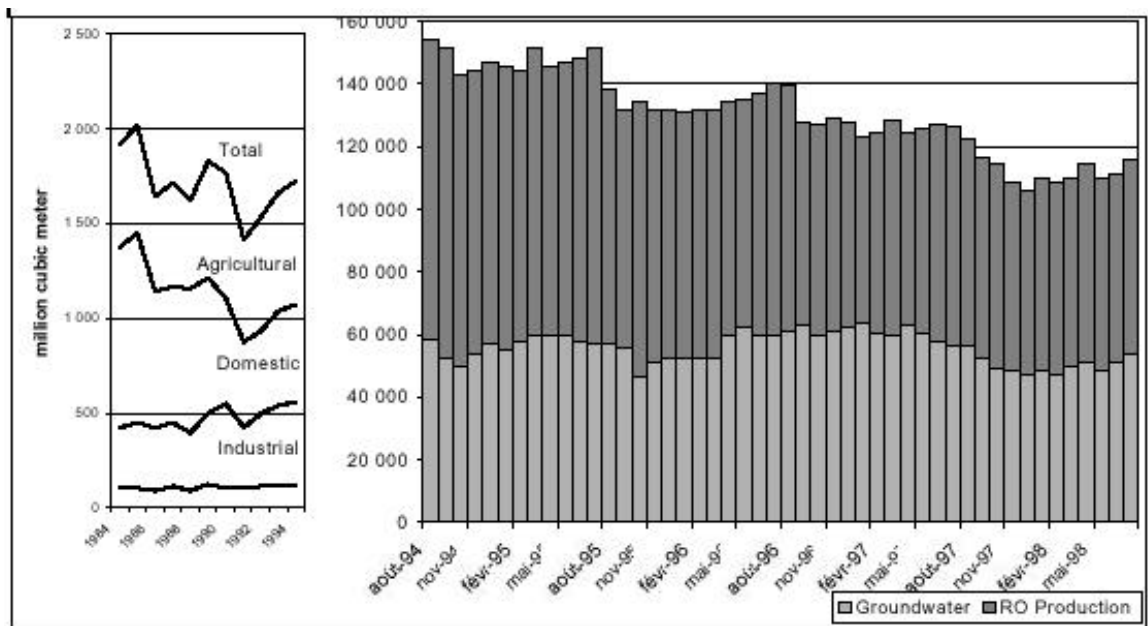
Existing infrastructures could be used in smarter ways, rather than building new facilities. The challenges we face are to use the water we have more efficiently, to rethink our priorities for water use and to identify alternative supplies of this precious resource.

#### 3.2. Water saving

An appropriate land-use ordination would provide the basis for river basin recuperation and for the conservation of water ecosystems and sustainable yields of fresh water. Although there are some positive examples (as shown for example in the Boxes in Annex 5), such a goal may take decades to be fully operative. In the short term, sustainable yields of water for man and nature can only be provided by water saving. There is an important potential to improve the efficiency of water resources in many countries. A first line of attack is to increase irrigation efficiency. More efficient and environmentally sound technologies exist that could reduce water demand on farms by up to 50 percent (Postel 2001). Reducing loss of water both in urban and irrigation networks can provide from 30-50% saving of irrigation water and from 28% to 50% in urban water (Medtac, 2000). The Global Water partnership, the World Bank, and the Blue Plan are all actively pursuing such issues in the region.

Few countries are slowing down their water demand (Israel, Malta, Tunisia). Figure 11 represents two examples of water demand decrease.

**FIGURE 11**



Left: Israel, demand evolution 1984-1994

Right: Malta, evolution water production 1994-1998 (RO: reverse osmosis)

Source: Blue Plan, 1999

In coastal areas where many economic sectors, and specially tourism, depend on the availability and quality of water, non-conventional water resources like desalination and wastewater reuse have been developed. Desalinization is still expensive, but costs are declining rapidly, in places making it a competitive alternative for drinking water supply (eg Israel). Most smaller islands also rely on it to cover from 18% to 50% of the water use in the domestic sector. Desalinization is also used in Spain, Cyprus, Malta, Tunisia, Egypt and Libya.

The technology to desalinize brackish water or saltwater is well developed, but it remains expensive and is currently an option only in wealthy but dry areas near the coast (Martindale 2001).

Wastewater reuse (e.g. in Tunisia) also has an important value because it substitutes good quality water in uses like irrigation of urban gardens. In Israel, treated wastewater already accounts for 30% of the water supply (Postel 2001), mainly for agricultural irrigation of non-food crops. Similar efforts are running in the Canary Islands. Efforts to capture, treat and reuse more wastewater are also under way in Jordan (Gleick 2001).

Our diagnosis points to water saving in agriculture as the most urgent single need; water saving techniques need be widely spread to large and small farmers because water consumption is already reaching unsustainable levels in the countries where agriculture has the highest social and economic significance, and where prospects are of mounting demand for the resource together with demographic growth. Water saving would also mean curbing down the needs for investments in heavy infrastructure, which is the main factor responsible for water loss and irreversible habitat fragmentation.

### 3.3. How to use the water saved ?

A higher availability to any resource does not necessarily mean a better use, but rather, a higher consumption. In the case of Mediterranean water, savings could be used to- satisfy a growth in demand, in some parts to improve the access to drinking water, but most likely there is a risk that saved water is again promoting an increase of agricultural lands under irrigation schemes.

It could be wiser, perhaps, to consider saved water as a buffer to offset climate change, which is expected to cause water shortages and increased unevenness in its spatial and temporal distribution. Saved water

may also help to reduce the need for new supply side measures, often very expensive, as water transfers, or even desalinization.

Taking account of the general situation described through this document, saved water could also be returned to nature, supporting highly threatened ecosystem services and functions.

### **3.4 New policies to save water**

Experience to date (see following sections) shows that water pricing and decentralization of irrigation management with a direct responsibility from the users are amongst the best tools for water saving. Information and training to water managers and water users is also necessary.

Increasingly, pricing is being used to reduce water demand during water shortages and to encourage farmers to invest in water conservation technology, such as drip irrigation. The higher costs of these technologies (relative to simple flooding methods) have been a barrier to their spread, but so has the prevalence of national water policies that discourage rather than foster efficient water use (Postel 2001)

In general, farmers take the initiative to transform their irrigation systems into more efficient systems not because of the price of water, which is subsidised in most countries and which is low for the producer, but because of the limited availability of water. With no proper information and technical assistance, the hardest thing to do is to convince farmers to change their crops, since they are used to particular techniques and farming cycles that they can control, as well as to more or less stable markets or, if unstable, still familiar to them. Carles (1999) points out other reasons for the modernisation of medium or large farms, which focus on water saving, because it implies major saving in other inputs, such as workforce, energy, protection measures and fertilisers. Technicians assert that the price paid by farmers for the irrigation water must depend on the consumed volume, even though certain amount is fixed. Similarly, several authors (Carles, De Miguel) state that, in crops irrigated by ground water, farmers cover all the direct costs deriving from the overexploitation of aquifers. Anyway, we should not forget that the major problem regarding ground waters is the overexploitation of aquifers beyond its renewing capacity.

In the northern Mediterranean countries, subsidies from the EU Agricultural Community Policy have shaped most of present use of water. These policies are now turning to consider agricultural activities also as an important environmental and landscaping factor, and have established a new set of “Agro-Environmental” subsidies, supporting technical conversions to better environmental standards. Nevertheless, the EU will not liberalise agriculture, and irrigation schemes will still be subsidised; globally, these incentives are perverse to sound trade-offs with ecosystem and environmental needs, as agriculture only produces a small % of the GNP in the EU (<10%)<sup>3</sup> while the economic, social and ecological value of healthy water ecosystems (wetlands, lakes, lagoons, rivers, and all the biodiversity they harbour) does not count in the economic balances.

As detailed in the next section, all around the Mediterranean politicians, scientists, technical bodies and civil society have expressed awareness about these problems and in many different fora, agreements and declarations recognise Integrated river basin and water management as a priority for all Mediterranean countries. It certainly seems an important and appropriate issue for trans-Mediterranean cooperation.

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<sup>3</sup> In California, supporting 100,000 *high-tech* jobs requires some 250 million gallons of water per year; the same amount of water used in the agricultural sector sustains fewer than 10 jobs - a stunning difference (Gleick 2001)

## 4 International policies and instruments promoting environmental concerns in integrated river basin management

Water is mostly managed at the national level as there is no agreed international Convention on this topic. However, at least three international Conventions are related to sustainable management of land, water resources and biological diversity, from where elements for a wiser management of water basins can be drawn.

In the past five years international concern and activities on sustainable water and basin management has grown significantly in the Mediterranean and worldwide. This chapter presents a brief description about the policies and institutional approach to face the management of water and river basins, and their recent evolution. A more detailed description of all these elements is in Annexes 1 and 2.

The **Ramsar Convention** of which 24 Mediterranean countries are contracting parties, recently calls to *"integrate the conservation and wise use of wetlands.... in the planning and decision making processes, at national and local levels, about land-use, groundwater management, the planning of river basins and coastal zones...."*. It also calls, through Resolution VI.23, to involve the Ramsar National Committees and local water stakeholders in integrated water catchment management and to work jointly with specialised organizations in all matters relative to water management. Consequently, the Ramsar Convention has adopted the River Basin Initiative (2000) in order to *"integrate biological diversity, wetland and river basin management"* in a joint effort with the **Convention on Biological Diversity**. Its goal is: *"to establish a global network to share information, and link and support activities where the principles of integrated management of biodiversity, wetlands and river basins are demonstrated."* The first conclusions of RBI, as a result of a quest to the Ramsar contracting Parties in Mediterranean are:

- the need of better integration of the management of biodiversity, wetlands and river basins;
- the need for information, with priority in policies and legal instruments, and
- planning procedures and mechanisms for promoting ecosystem approach to integrated river basin management.<sup>4</sup>

Also, the Conference of the Contracting Parties to the CBD has adopted an ecosystem approach for the implementation of this Convention.

The **CCD (Convention to Combat Desertification)** calls its Parties, through cooperation between all levels of government, communities, NGOs and land users... including peasants, shepherds, women and their representative organizations, .....to the establishment of the institutional means and appropriate policies to combat these phenomena, e.g. the integrated management of natural resources, including agricultural lands and rangelands, forests and vegetation cover, wildlife, and water resources. Its last COP (October 2001) agreed that *"the management of water resources shall complement the fight against desertification and other forms of environmental and ecological degradation"*.

Over 90% of the Mediterranean countries are signatory parties to these Conventions.

Not only these international Conventions, but numerous and important Ministerial Declarations have recognised the need for sound water management and committed to establish all necessary policies and means. Such is the case of the **Dublin Principles** of 1992, stating that:

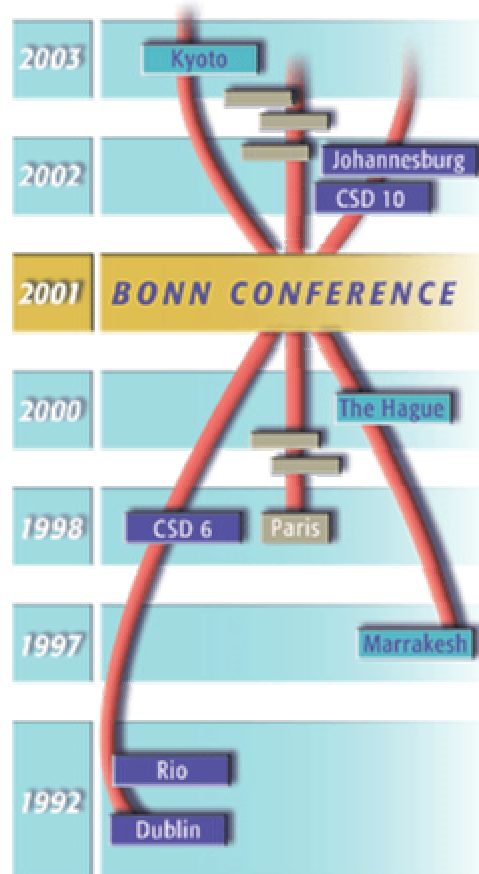
- *Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment.*
- *Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.*
- *Women play a central part in the provision, management and safeguarding of water.*
- *Water has an economic value in all its competing uses and should be recognised as an economic good.*

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<sup>4</sup> Drawn from questionnaires to the Ramsar Parties in the Mediterranean, about *The national needs and contributions assessment on integrating biodiversity, wetlands and river basin management*.



The following figure describes the chronological evolution of the recent Ministerial meetings on water issues, which have converged in the Bonn Conference of 2001, which in turn prepares the world for water management decisions to be taken in the U.N. Earth Summit (Johannesburg 2002) and the future World Water Forum III in Kyoto in 2003.



During the 2<sup>nd</sup> World Water Forum (The Hague 2000) a Mediterranean Framework of Action (MFA) was proposed, including key guidelines for action and insisting that peace and political stability is a necessary framework for success in water management (specially in light of the co-management of jointly shared basins and resources in the Middle East and in the Balkans). It stressed the need to change the political framework of water management and develop a new philosophy of governance in the region. It showed that without information exchange and the proper participation of all concerned parties (users, institutions, private sectors, donors, etc.), no sustainable water management will be possible. The Conference abounded in that water economy in the Mediterranean entails two specific problems: high irrigation needs and increased tourism demand during the summer period. Every drop of water in the Mediterranean region must be used and reused if sustainable water management is to be achieved. Reusing wastewater is an old practice, but developing this on a large scale requires a regulatory framework now lacking. Guidelines for Mediterranean water reuse were identified. The session concluded that political willingness in the region is not sufficient, and the MFA should be backed by funding.

The main milestone on the development of the integrated water management is probably the **Bonn Declaration** (2001, Bonn International Conference on Freshwater), declaring:

- *“For sustainable development, it is necessary to take into account water's social, environmental and economic dimensions and all of its varied uses. Therefore, water management requires an integrated approach.”*

- *integrated water resource management is needed to bring all water users to the information sharing and decision making tables”.*

The Bonn Declaration urges that policies and management of water resources must take account of other international agreements as CBD, CCD, Ramsar, and Climate Change. Water distribution must seek an equilibrium between different demanding and competing sectors, taking into consideration the social, economic and environmental values of water, and the existing relation between surface and groundwater, land administration and the need to keep the integrity of ecosystems. River basins, lakes and aquifers must be the primary framework for water resource management. To this end, it is necessary to create and promote the necessary institutional and participative mechanisms. The decision making processes, project execution and services operation must be as decentralised as possible.

Also in Bonn the Dialogue on Water, Food and Environment -with 130 participants and 10 sponsoring organisations (FAO, GWP, ICID, IFAP (Int'l Federation of Agricultural producers), IUCN, IWMI, UNEP, WHO, WWC, WWF)- concluded about the need of greater dialogue between agricultural and environmental sectors to develop a shared vision on water management, a knowledge bank to sustain dialogue and a network of field projects at local levels and river basins, implementing innovative focuses and solutions improving the sustainability of water provision for agriculture and for nature.

At the multilateral level, support for these new policies is also clear. The **United Nations** have repeatedly asked to put an end to the unsustainable exploitation of water resources by formulating management strategies at the regional, national and local levels. The Global Water Resources Evaluation Programme aims at the development of instruments and competence to improve the understanding of the main processes, the management practices and the policies that will help improving the quality and supply of fresh water on the planet. In particular, FAO's Land and Water Development Division (AGL) is concerned with sustainable use and conservation of water in agriculture. It assesses water resources and monitors agricultural use, and promotes appropriate water policy and integrated water management in river basins including information sharing and conflict resolution in shared river basins.

On its side, the **European Union** has approved (2001) the Water Framework Directive, a main obligatory-policy provision in our region, for water management integration with ecosystem and environmental criteria, but it affects only the EU member states (France, Greece, Italy, Portugal and Spain). It aims to prevent further deterioration; to protect and to improve aquatic ecosystems, and to cover water needs of terrestrial ecosystems and wetlands directly dependent on aquatic ecosystems. If countries like Slovenia, Cyprus and Malta (and possibly Turkey at a later stage) become member states of the European Union, this directive will also apply to them.

## 5. Policies and instruments with specific focus on the Mediterranean region

### 5.1. The policies

Not only worldwide, but the widely acknowledged strategic importance of water in the Mediterranean is shown by the existence of numerous international, regional and multilateral organisms working on the subject at the regional level. The World Bank and the European Union are the major donor organisms. A more detailed description of the following Mediterranean policies and organizations is in Annex 2.

The Agenda 21 for the Mediterranean (Tunis 1994), accepted by all Parties to the Barcelona Convention, states that “Integrated water resources management is based on the perception of water as an integral part of the ecosystem.....water resources have to be protected, taking into account the functioning of aquatic ecosystems and the perennality of the resource, in order to satisfy and reconcile needs for water in human activities”.

Following its EuroMediterranean policy (Barcelona 1995) the European Union established the SMAP (Short and Medium-term Priority Environmental Action Program for the Mediterranean), a framework programme working on five aspects, one of which is integrated water management, once again, considered as an essential feature for environmental protection and sustainable development in the Mediterranean basin. Between the most urgent measures in this sector is the protection of water reservoirs and wetlands and, if necessary, the establishment of management plans for river basins and water catchment areas, the establishment and implementation of programmes aimed at reducing water losses – including the improvement of existent networks, leak detection, preventive management, cartography and training– and development of techniques to reduce the use of water for irrigation. It also encourages

support to non-centralised authorities (basin committees, local agencies, etc.), by means of gathering together both consumers and local communities, based on the distribution of responsibilities.

At a governmental level, the Mediterranean Water Network brings together representatives from the water sector of 15 Mediterranean countries (generally represented by the Secretary Generals of water resources), and is financed by the EU and the World Bank (WB). It aims at promoting the development of technology in matters concerning water, exchange information on such aspects as assessment of resources and water demand, planning methods and techniques, administration of water resources, legislation and regulations. However, they do not declare explicit support to integrated management of river basins and the trade-offs between water and nature. The same goes for the Turin Ministerial Declaration, that recently established clear policies for EuroMediterranean cooperation on water management, calling for sustainable use of water and balanced trade-offs between water demand and ecosystem needs.

## 5.2. Technical assistance and information

A range of organisations are working towards sustainable water use in the region, on issues ranging from policy, to information and to field actions. This section illustrates some of these with no view to exhaustivity.

The **METAP** (Mediterranean Environmental Technical Assistance Program) EIA Initiative will help the 14 METAP countries to acquire the necessary technical and policy tools to establish credible and operational Environmental Impact Assessment systems. One of 3 METAP guidelines is "Integrated Water and Coastal Resources Management" on which a Regional Capacity Building Program depends, focusing on building regional and national capacity in Hot Spots (MED-BRANCH).

**BOX 2. METAP's networks** centred on priority themes for the Mediterranean:

- MEDCITIES for promoting decentralised cooperation and the institutionalised development of coastal towns
- MEDBRANCH developed within the Regional Programme for Capacity Building aimed at building national water management and pollution abating capacities in sensitive areas.
- MED POLICIES for promoting sustainable economic growth through the integration of environmental concerns in economic and budgetary policy.
- MED-ECOMEDIA for awareness raising and information.

Source: Mediterranean Commission on sustainable development MCDS, 2001. Strategic review for sustainable development in the Mediterranean region. UNEP/MAP, Athens, Greece

During the first two phases of METAP (1990-95), 58% of the funds were mobilised for project identification activities and 36% for capacity building.

The **CEDARE** (Centre for Environment and Development in Arab Region and Europe) main mission is capacity building in its 32 member countries, promoting skills in environmental management, transfer of technologies, environmental education and development of environmental policies. CEDARE is an intergovernmental network that also facilitates inter-country cooperation and exchange of information and experience through its Land & Water Resources Management Programme.

The **MED-HYCOS** focuses on contributing to water resources assessment and management by

helping the national hydrological services to strengthen their capacities and by promoting exchange of information and skills.

Several other organisms on information and monitoring are dedicated to generate and divulgate information on water management. The **METAP-CBU** (Program Performance and Monitoring - PPM) is an environmental monitoring system comprising a framework of specific indicators related to the METAP priority themes and is intended to assist countries to monitor their progress towards meeting environmental objectives. The **Blue Plan of the MAP** (Mediterranean Action Plan) is implementing the national and project environmental performance indicators (EPI) components under the supervision of the UNDP. Other organisms on the same topic are the **IHP** (International Hydrological Programme) of UNESCO, the **Aquastat**, and the **Semide** (Euro-Mediterranean Information System) focused on the know-how of water management. The latter is a partnership project allowing its members (Parties to the Barcelona Convention) to create an informatic structure to ensure specialised contacts on water resources, exchange of specialised informations, and the implementation of specific methodologies. Finally, as mentioned before, **FAO-AGL** (Land and Water Development Division) assesses water resources and monitors agricultural use, including information sharing and conflict resolution in shared river basins.

### 5.3. Main funding sources

The **MEDA** of the EU is the main financial instrument of the SMAP program. There are 12 Mediterranean countries as beneficiaries of this European cooperation programme: Morocco, Algeria, Tunisia, Malta, Cyprus, Turkey, Egypt, Jordan, Israel, Syria and the occupied territories of Gaza and the West Bank. In the environmental area one of the choices is integrated water management. One example is Morocco in MEDA II, with 120 million Euros intended for the adjustment of the water sector, including actions on drinking water or irrigation. The main objectives of these programmes are: launching Basin Agencies; regulating the different water uses (specially water for agriculture); protecting water resources and developing public-private partnership.

The **EU LIFE-Environment** (only for EU member states, holds 47% of the total LIFE budget) aims at, between its priorities, the promotion of the sustainable management of groundwater and surface water. While the **LIFE-Third Countries** focuses on technical assistance actions to be implemented in third countries bordering the Mediterranean. It aims at the creation of administrative capacities and structures necessary in the environmental field, and the development of policies and action programmes. Finally, the **EU Line 6200-Environment** for cooperation applies to Mediterranean developing countries, assisting in the implementation of their international obligations regarding multilateral environmental conventions (LCD, CBD, CC).

The **GEF-Water bodies** seeks at integrating land and water projects. It underlines the regeneration of the damaged systems. In particular, the projects included in this component envisage the integrated management of freshwater river basins and coastal areas. Finally, the **METAP NGO Small Grants Facility** (SGF) provides grant support for small-scale innovative activities that support the METAP priority themes and are initiated by community-based organizations and NGOs. The SGF is active in Turkey, Algeria, Jordan, and Lebanon.

### 5.4. Fora, Networks and Civil Society

A high number of NGOs, scientific, technical and professional groups, and other associations work on water management issues around the Mediterranean. Most significantly, there are several Fora in which civil society participates jointly with international and national institutions. A more detailed description about these Fora and NGOs is in Annex 3.

Between NGOs, **WWF** (Med.PO) and the **MIO/ESCDE** organisation of NGOs have particular policies and field actions on the subject. Numerous technical organisations are active on water and river basin management, such as the **ICID** (International Commission on Irrigation and Drainage) working on the concept of water-for-food-and-nature; it is a scientific and technical NGO made up of members from 88 countries and a member of the **World Water Council**, and with a consultative status in the United Nations Economic and Social Council (ECOSOC), in UNESCO, in WMO, and in FAO. Also the **CIHEAM** (International Centre for Advanced Mediterranean Agronomic Studies) aims at town and country planning and water resource management, while the **IME** (Institut Méditerranéen de l'Eau –1982), was entrusted by the Global Water Partnership with the animation, coordination and technical assistance of the MEDTAC.

The **MEDTAC** (Mediterranean fora of the Global Water Partnership) is inspired by the Principles of Dublin and the Earth Summit. Its goals are to clearly establish the principles of sustainable management of water resources, and to support actions that bolster the principles of sustainable management of water resources in the local, national or river basin areas. Some of the specific topics focused by MEDTAC are water conservation and the interaction of water, food and the environment.

The **MEDWET** (Mediterranean Wetlands Initiative), supporting the close linkages between wetland conservation and river basin management, is undertaking a project in order to design the guidelines of integrated river basin management (for more information see Box 3 and Annex 4)

### BOX 3 MEDWET

The Ramsar Convention on Wetlands, under whose guidance the MedWet Initiative has been developed, established the **Mediterranean Wetlands Committee**, including representatives of 25 Mediterranean governments, the Palestinian Authority, the European Commission, intergovernmental conventions and UN agencies (Barcelona/UNEP; Council of Europe/Bern; Ramsar; UNDP), non-governmental organizations (BirdLife International, IUCN, Wetlands International, WWF International) and the Wetland Centres **Greek Biotope/Wetland Centre** (EKBY), **Station Biologique de la Tour du Valat** in France, and **Sede para el Estudio de los Humedales Mediterraneos** (SEHUMED) in Spain.

In 1999 MedWet became a formal inter-regional structure for the implementation of the Ramsar Convention (Resolution VII.20 of Ramsar's COP7) and serves as a model for regional wetland cooperative structures elsewhere.

The goal of MedWet is **"to stop and reverse the loss and degradation of Mediterranean wetlands, as a contribution to the conservation of biodiversity and to sustainable development in the region."**

The eight general objectives of the Strategy address:

- achieving wide acceptance and implementation of Strategy;
- achieving wise use of Mediterranean wetlands;
- improving knowledge and awareness of wetland values and functions;
- reinforcing the capacity of institutions and organisations; ensuring effective management of all Mediterranean wetlands;
- conferring legal protection on major wetland sites;
- strengthening international co-operation and increased financial assistance;
- strengthening collaboration among all involved, governmental and non-governmental, public and private sectors.

One key element in MedWet philosophy is that each wetland site cannot be seen as an isolated independent island. It is part of a wider whole, at the centre of many concentric circles: surrounding area, catchment basin, region, country, and the Mediterranean. Its future depends, therefore, on actions taken at each of these levels. MedWet maintains that wetland conservation depends on concerted actions at all levels simultaneously (Papayannis and Montemaggiori, 1996)

## 6. National policies on water management; regarding river basins

Previous sections show a strong international will for integrated water management, worldwide, in the Mediterranean region and in the EU. Nonetheless, when these international provisions need be taken to national policies and regulations, they may vary greatly between the large diversity of Mediterranean countries. Even within the EU countries, linked to the new EU Water Directive, differences in legal provisions, land-use and water-pricing policies, institutional arrangements and participatory procedures in planning and implementation are significative, and would need specific country-by-country analyses of gaps and opportunities. Extending this analysis to all countries in the Mediterranean basin would be a lengthy project. However, national situations and experiences provide illustrative samples of the real context and difficulties around the concept and practice of integrated water and river basin management. Additionally, some illustrative cases of positive and negative experiences in river basin management are presented (Annex 5).

The main conclusions which can be drawn from these cases in Annex 5 (Boxes 4, 5, 6, 7, 8, 9 and 10 on cases from France, Morocco, Spain, Tunisia and Turkey) show how integrated water management is based on institutional coordination and on the active participation of users and other stakeholders. We can also learn that positive results always occurred together with the decentralization of water management decisions at the local and basin levels.

### 6.1. Some national examples

**In Spain**, according to the Water Act, all actions performed by the hydraulic Administration regarding water will be based on the National Hydrological Plan (PHN) as well as on River Basin Hydrological Plans (PHC), which are drawn up by river basin institutions. All the decisions taken about water -surface of underground- are subject to hydrological planning. However, the application of this requisite has needed a long period because of its complexity, and its preparation has taken almost ten years.

Some contradictions exist among Spanish ministries (Environment and Agriculture) in a basic factor as water intended for irrigation. Surprisingly enough, the Ministry of Environment favours a higher increase in irrigated surface than the National Plan of Irrigated Land. The proposed National Hydrological Plan (PHN), a macro-investment plan of over 20,000 million Euro in 10 years, is based on inter-basin water transfers, mainly from the Ebro catchment to coastal Mediterranean regions (see Box 4 in Annex 5), and has created many reactions by local stakeholders in Aragón and Catalonia, and in the rest of the country. Environmental impacts are deemed severe, including many internationally protected areas; it may also further open the development imbalance between the arid inland and the developed coastlines; other water saving alternatives have been proposed by opponents to the Plan, which has been denounced in Brussels as acting against the spirit of the EU Water Directive of 2001. This is an example of the political difficulties facing integrated river basin management, even though a Basin organisation exists. This is also a case of how the EU Water Directive of 2001 can be interpreted differently by different interest groups.

A second case from Spain is brought in Box 5 in Annex 5, the Guadiamar Green Corridor, is a case of regeneration of a polluted basin. In 1998, the retention wall of the tailings dam broke at the pyrite mines in Aznalcollar and the Agrio and Guadiamar rivers were flooded by a toxic containing sludge and water polluted with heavy metals. The fact was recognised as one of the most catastrophic environmental events ever in Spain, as these rivers feed parts of the Doñana wetlands (a National Park and Ramsar site) and drain to the Guadalquivir fishing areas. After a quick and coordinated response from national and local administrations, which allowed to pick up thousands of tons of toxic mud spread all over the flat landscape, and applying other measures such as massively planting toxic capturing species of plants, the catastrophic event opened a new approach for planning an integrated basin action plan, including prevention of further pollution from towns and widespread agribusiness industries, and recuperation of the ecological connectivity of the landscape. The successful regeneration works and promising land-use plans were made possible thanks to a common vision and a consensus on action, both built through a participatory process. The Guadiamar is a good example of planning river basin regeneration with ecological criteria, promoted from national and regional governments with full participation of local stakeholders, socio-economic agents, towns, scientists, NGOS, and the National Park authorities.

**In France** (see Box 6 in Annex 5) the decentralization of water planning and management is ensured by the 6 Committees of River Basins, which elaborate a SDAGE (Schéma Directeur d'Aménagement et

Gestion des Eaux), subsequently approved by the State. One of these, as an example, the Comité de Bassin Rhône-Méditerranée-Corse has 124 members grouped in several colleges: territorial and local communities; competent persons and users; representatives from socio-professional sectors and State representatives. The Water Agency receives payment from users depending on the amount of water used or the pollution generated, fostering that each individual makes a better use of water. These revenues allow the Agency to finance studies, works and activities that help fighting the squander and pollution of water. The principle followed in this case is "the one who protects the environment (preserves, economises on the resource, combats pollution) will be helped". One of the areas on which the Agency operates is to co-finance the recovery and preservation of the aquatic environments.

**In Turkey** (see Box 7 in Annex 5) the transfer of irrigation systems to users started gradually in the early 1950s, but in 1993, with WB financial support, the country accelerated this decentralization process, because an 83% shortfall was estimated between operation and maintenance allocations and state-wide collected tariffs. In 5 years, 1.5 million ha have been transferred. Transfer was supported with enhanced internal training, including seminars and workshops. Positive results at pilot schemes included an increased sense of responsibility, more reliable and equitable water supply, improved irrigation efficiency (water saving increased by 34% and in energy use by 31% in 5 years) and a collection rate increase from 42 to 80 percent.

**Tunisia** (Box 8 in Annex 5) has developed expertise in the fields of water resources mobilization and integrated management in a context of aridity, water scarcity and social and economic constraints. This expertise has been supported from the outset by a national strategy, strong political commitment and increasing user awareness.

Tunisia has embarked on a new irrigation policy, which gradually shifts water-management responsibilities and costs to the local administrations (WUAs), and now their capacity to develop this mission remains to be seen. One of the special features of the Tunisia policy, however, is the creation of associations of underground-water users that will improve management of the water requirements of all irrigators using a shallow aquifer. The outputs of this measures, for the moment, have been 25 % of water saving and an increase of 33% in water-use efficiency.

A particular case from Tunisia is the **Ichkeul National Park** (Box 9 in Annex 5), one of the main wetlands in the Mediterranean basin, recognised as a Ramsar Site, Biosphere Reserve and World Heritage Site. Its lake and marsh (12,000 ha) have seasonal variations in water depth and salinity, influenced by inflow of fresh water from the catchment in winter, and in summer by reverse flow of sea water. The low salinity in winter promotes the development of aquatic plants and presence of some 200,000 wintering migrant water birds. Since its international recognition it was noted that the construction of 6 dams, as planned in the Master Plan for the Waters of Northern Tunisia, was likely to have an impact on the ecological character of the site. Three dams were built between 1982 and 1992 causing a significant change in the local hydrological system. The Ministry of Agriculture evaluated the impact of the dams, organized an international seminar and stated a multidisciplinary study, and as a result numerous measures were adopted by the Tunisian authorities: the decision to cancel the construction of the other 3 dams and the classification of Ichkeul as a water user (with an annual allocation of 20 million m<sup>3</sup>). Now the fundamental question is whether it is possible to restore the previous richness. The area needs an integrated management plan and the government plans an interministerial and public participation process capable of developing and implementing it. The plan will take account of the human users: fishermen and graziers, visitors and tourists. The implementation of the Plan will include reinforcing the management body with the necessary powers of action. This is a case where a government has taken very important decisions to allocate scarce water resources to a wetland and to restore a very important hydrological system, on which the participation of local users is fundamental, and where different governmental departments need coordinated action: Forests, Hydraulic Works, Rural Engineering, Fisheries and Aquaculture, all in the Ministry of Agriculture, plus the Ministry of the Environment.

**In Morocco** (Box 10 in annex 5), a pilot project for land-use planning in a dry and environmentally degraded region in the mountains of the Rif, shows how the participation of local inhabitants allows reaching agreement on a long term vision of development. Environmental measures must go together with concrete improvements in the basic human needs, in this case basic infrastructures, or with micro-projects generating local income. Development projects must take into account the local knowledge, use and mobilise the local capacities, and at the same time work to strengthen these capacities within all interested parties, either civil society and public institutions.

## **7. Challenges for the implementation of environmental concerns in integrated water resources management in the Mediterranean**

### **7.1. The needs**

The previous sections have shown:

- The urgent need for strengthened integrated river basin and water management,
- The strong international commitments in this direction, encouraged from international agreements, policies and organizations, and
- The complexity to make this concept operative (the topic includes land use planning, water storage and distribution, water use and disposal).

National cases show that there are some recent, pioneering and partial, attempts to start the implementation of these sound policies. However, there is a long way to go before we see the rationalization of water use and disposal, and before we see that sustainable yields, of quality water, are guaranteed for ecosystem functions and freshwater species.

The first challenge is ensuring sustainable yields of water through all seasons. For our region, this means the regeneration of vegetation cover in most basins, land-use planning schemes, reforestation, prevention of fires, overgrazing, and the resulting erosion, plus cutting down the exploitation of groundwater to sustainable rates.

The second challenge is reducing water demand. Most importantly, agriculture should become much more water-efficient everywhere (with the possible exception of the Balcanic countries, France and Turkey); on coasts and on islands, water demand from the massive summer tourism should stop claiming water from the shallow aquifers.

Among the barriers to better water planning and use are inappropriately low water prices, inadequate information on new efficiently technologies, inequitable water allocations, building dams, and government subsidies for growing water-intensive crops in arid regions (Gleick 2001)

### **7.2. The responses**

Because of its links with agricultural exports and tourism services, water management is a highly economic issue. Due to the scarcity of this resource, recently also political, social and scientific sectors are interested on this topic at international and national levels. The water agenda has become of such a strategic importance around the Mediterranean that most international and multilateral organisations and donors have included water management within their priorities for the region.

At present, the integrated river basin management approach is strongly encouraged by international Conventions, Agreements and Declarations. At least at the European level this has turned into clear policies. In the Mediterranean this concept is generally accepted by many organisms, with a growing tendency to analyse the effects in the ecosystems.

Based on documental information, at the regional level there seems to be a very important institutional capacity already in place to make action out of good words. A (surprisingly) high number of multilateral and technical organisations and international fora are willing from different angles to move towards sustainability in the use of water.

### **7.3. The constraints**

In spite of it, water demand keeps on the rise, irrigation continues to expand, building of dams and heavy infrastructure are still a priority, even burdening national budgets. Interinstitutional coordination, land-use planning, integrated basin management and water saving efforts are still exceptions, and the already impacted ecosystems continue their degradation process. Many reasons seems to be causing this situation.

There seems to be important gaps and weaknesses in implementing these international policies at the national and particularly at the local levels, in planning, participation, coordination and coherence between different stakeholders. At national and local levels water is still managed sectorially with a focus on covering demands for agricultural and urban (and tourism) growth, and institutional arrangements within countries reflect this sectorial (and obsolete) approach.



Sometimes the short-term interests and acquired rights aren't easy to overcome. Also, agriculture is the main water consumer, but the farmers are generally the population with a lower income, so the price of water continues to be subsidised, which in turn does not promote saving.

All in all, there seems to be an important gap between new international policies and real local practices.

The coordinated management of all factors that influence the river basin involves many governmental departments and local authorities, and the experience often shows the great difficulties to coordinate their actions. In some countries the decentralization needed to manage water and basins, is non existing or non operative. When existing, and in spite of the encouraging policies, there aren't mechanisms to ensure participation and co-responsibility from local stakeholders in planning the management of water and basins.

Technical capacity needs to be strengthened at national and local levels, particularly in southern and eastern countries, where the environmental situation is under higher stress. At local levels there is a lack of leading organizations with a clear view for integrated river basin management and able to mobilise resources, promote participation and coherence, create consensus and push win-win proposals and solutions at the national and local levels.

The users and most stakeholders are often unaware of the high water losses and the potential for saving. In general, there seems to be little information and awareness about the problem and about the international commitments and agreements. At national and local levels great efforts remain to be done to raise concerns about the linkages between the management of river basins and the availability of water, about water management and nature, on the unsustainable trends, either for agriculture, economics or nature, and on the implications of this lack of awareness and action in the mid-term development options for most Mediterranean countries.

An additional difficulty for the integrated management is the fact that some basins are transboundary. This is the case of Egypt (100%), Syria (80%) or Israel (55%). The most extreme example is the Jordan basin which is shared by five countries: Jordan, Israel, Palestinian Authority, Syria and Lebanon.

Any integrated water management should address water demand. Technical measures such as the introduction of new irrigation technologies or equipment are not sufficient. Financial measures such as pricing water at its real cost may be necessary but politically more difficult to implement. Finally, the involvement of water users is a key element of a successful integrated water-management strategy.

In summary, there has been quite a progress in regional policies and political declarations, and there is a broad consensus on the need to save water and be more water-efficient throughout, but much remains to be done in the field of real action. This situation is analogous to other sustainability and conservation problems and challenges around the world; in the case of water, progress may be expected in the years to come as most of these policies, declarations and fora have only been launched as recently as in the last 2 or 3 years.

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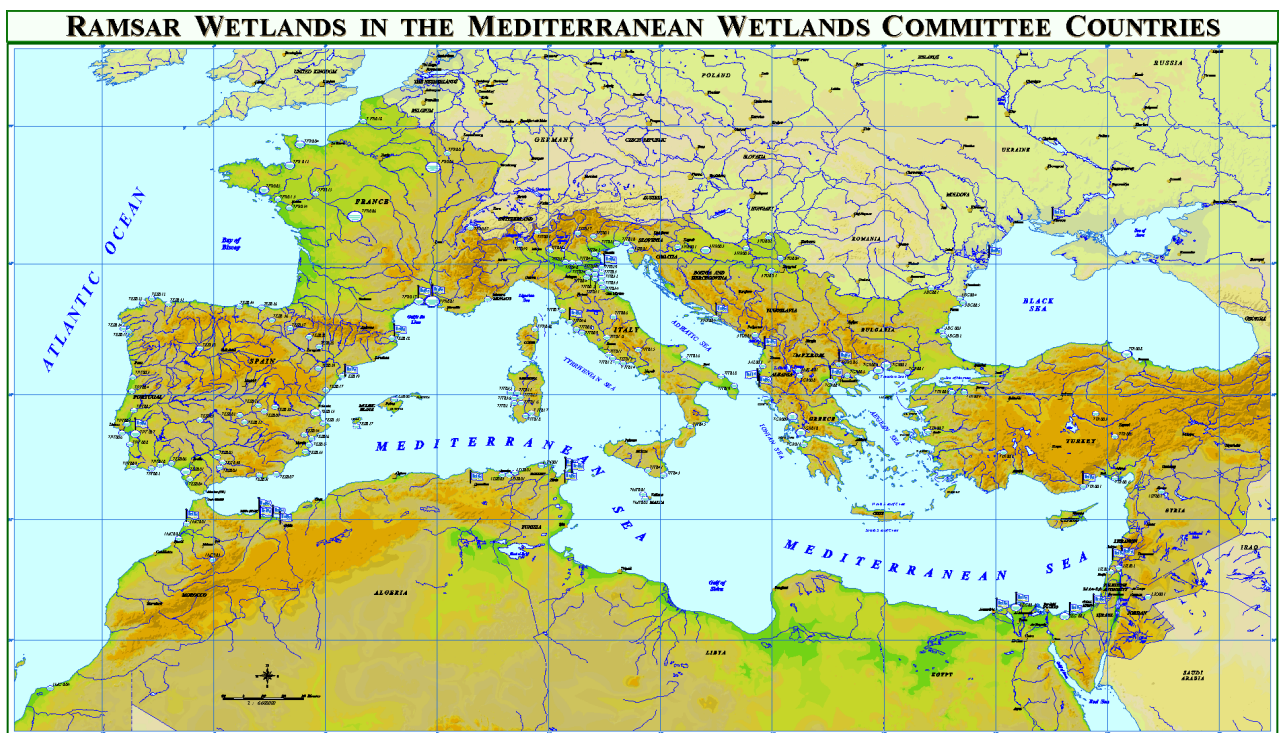
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## Annex 1

### INTERNATIONAL AND MULTILATERAL POLICIES WITH DIRECT OR INDIRECT APPLICATION TO RIVER BASIN MANAGEMENT IN THE MEDITERRANEAN

#### a). The Ramsar Convention

At its first signature in 1971 strongly motivated by water bird conservation, and on the wise use of wetlands later, the Ramsar Convention, signed by 25 countries in the Mediterranean, through its recent Resolutions has provided for the wise management of the water basins feeding the listed wetlands of international importance.



source: Ramsar/Medwet/ Greek biotop Wetland Center

In this sense, Resolution VII.18 in its 7th Conference (Costa Rica 1998) remembers the Operative Objective 2.2 of the Convention's Strategic Plan 1997-2002, asking the Contracting Parties to *"integrate the conservation and wise use of wetlands..... in the planning and decision making processes, at national and local levels, about land-use, groundwater management, the planning of river basins and coastal zones....."*. also calling, through Resolution VI.23 to involve the Ramsar National Committees and local water stakeholders in integrated water catchment management and to work jointly with specialised organizations in all matter relative to water management.

Consequently, the Ramsar Convention has adopted the River Basin Initiative (RBI) in order to *"integrate biological diversity, wetland and river basin management"* (May 2000) in a joint effort with the Convention on Biological Diversity. Its goal is: *"to establish a global network to share information, and link and support activities where the principles of integrated management of biodiversity, wetlands and river basins are demonstrated."*

The Ramsar CCP in Valencia (Nov.2002) will be the first one to take place in the Mediterranean region. There, its Draft Strategic Plan (2003-2008) will be issued, giving greater priority to the following activities among other to

- Elaborating and implementing institutional frameworks, policies and laws (including legal requirements) related to assessing procedures that take into account the wide range of environmental, social and economic values of wetlands;
- Developing further the special programmes of the Ramsar Convention intended for particular regions or issues, such as the Mediterranean Wetlands Initiative (MedWet)
- Again it claims for “Integrating the conservation and rational use of wetlands with the planning and with the national, provincial and local decision-taking processes, particularly regarding river basin management, coastal areas management, and groundwater resources management”.

Ramsar is actively participating in the World Water Council (WWC) and the Global Water Partnership which aims at the integrated management of water resources.

Through questionnaires the RBI has assessed in 2001 the needs and contributions for information in 84 countries; among the results the countries stressed the need to share information for better integration of activities in management of biodiversity, wetlands and river basins activities; there should be flexibility in sharing information in order to adapt to regional differences and preferences of users.

## **b). The Convention to combat Desertification**

Twenty Mediterranean countries and the European Union are Parties to this Convention, which entered into force in Dec.26, 1996. . This Convention includes several provisions which can be used to promote a sustainable management of river basins.

Articles 3.c) and 10 state that the Parties shall, through cooperation between all levels of government, communities, NGOs and land users... including peasants, sheperds, women and their representative organizations..., to promote better understanding of the value of land resources and scarce water resources aiming at policy planning, decision taking, and the execution and revision of national plans pursuing the sustainable use of these resources. Article 4.d) calls for cooperation between the Contracting Parties, while Article 7 gives priority to African countries, included those bordering the Mediterranean. Article 8 in the Annex of regional application in Africa calls to determine the factors contributing to desertification and draught and to the establishment of the institutional means and appropriate policies to combat these phenomena, e.g. the integrated management of natural resources, including agricultural lands and rangelands, forests and vegetation cover, wildlife, and water resources.

There is a specific Annex for northern Mediterranean countries (those who can pay for themselves) calling for the issue of National Plans to combat desertification, including measures related to:

- (a) Legal, institutional and administrative spheres
- (b) Modalities for land-use, ordination of water resources, conservation of soils, forestry and agricultural and range activities;
- (c) The conservation of flora and wildlife and any other manifestations of biological diversity
- (d) Protection against forest fires
- (e) Research, training and public awareness

Countries such as Spain, Algeria or Egypt have prepared national strategies against desertification that now need to be implemented.

The last CCP (Geneve Oct.2001) agreed that “the management of water resources shall complement the fight against desertification and other forms of environmental and ecological degradation”.

## **c). The Convention on Biological Diversity**

The Conference of the Contracting Parties to the CBD has adopted an ecosystem approach for the implementation of the Convention. Decision III/11 in its 3<sup>rd</sup> COP recognises the need for an integrated and multidisciplinary approach in planning and management of land resources and that attaining the multiple objectives related to sustainable agriculture and rural development needs an ecosystem approach, taking account of the interrelated impacts with freshwater environments, in view of which they establish links with the Ramsar Convention.

#### d). The Dublin 1992 Principles

Five hundred participants, including government-designated experts from a hundred countries and representatives of eighty international, intergovernmental and non-governmental organizations attended the International Conference on Water and the Environment (ICWE) in Dublin, Ireland, on 26 to 31 January 1992. The Conference Report sets out recommendations for action at local, national and international levels, based on four guiding principles.

- Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment.
- Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.
- Women play a central part in the provision, management and safeguarding of water.
- Water has an economic value in all its competing uses and should be recognised as an economic good

#### e). The Bonn International Conference on Freshwater (3-7 Dec 2001)

Government representatives of 118 countries attended the Conference. Among them, there were 46 ministers, representatives of 47 international organisations and delegates of 73 organisations made up of important groups and civil society. The International Conference on Freshwater has examined the function of water in sustainable development. Moreover, it has taken stock of the implementation of Agenda 21 determining in what way it can be improved.

Among the conclusions of Bonn five key points have been established in order to attain a better water management and to take an important step toward achieving sustainable development: *"the key to long-term harmony with nature is neighbour and cooperative arrangements at the water basin level, including across waters that touch many shores. We need integrated water resource management to bring all water users to the information sharing and decision making tables. Although we have great difficulty with the legal framework and the form agreements might take, there is substantial accord that we must increase cooperation within river basins, and make existing agreements more vital and valid".*

Throughout the Conference, the Ministries of 46 countries have also signed a declaration in which the following is stated: *"we confirm our resolve to stop the unsustainable exploitation of water resources by developing water management strategies at regional, national and local levels. Water is necessary in all aspects of life. For sustainable development, it is necessary to take into account water's social, environmental and economic dimensions and all of its varied uses. Therefore, water management requires an integrated approach."*

Water distribution must seek an equilibrium between different demanding and competing sectors, taking into consideration the social, economic and environmental values of water, and the existing relation between surface and groundwater, land administration and the need to keep the integrity of ecosystems. River basins, lakes and aquifers must be the primary framework for water resource management. To this end, it is necessary to create and promote the necessary institutional and participative mechanisms; The decision making processes, project execution and services operation must be as decentralised as possible.

#### **NOT STRICTLY MEDITERRANEAN ORGANIZATIONS WORKING IN THE REGION:**

United Nations organisms: UNEP, UNDP, FAO, World Bank (GEF), European Union (Water Directive, LIFE and Environment Line 6200).

#### a). Global (non-Mediterranean) organizations of the UN system

##### International Hydrological Programme (IHP)- UNESCO

This is UNESCO's intergovernmental scientific co-operative programme on water resources; a vehicle through which Member States can upgrade their knowledge of the water cycle and thereby increase their capacity to better manage and develop their water resources. It also aims at the improvement of the scientific and technological basis for the development of methods for the rational management of water resources, including the protection of the environment.



### World Water Assessment Programme

In its Millennium Declaration (Sept.2000), the UN decided to:

- Reduce by half in 2015 (....) the percentage of people lacking access to safe drinkable water or who can not afford it
- Put an end to the unsustainable exploitation of water resources formulating management strategies at the regional, national and local levels.

The World Water Assessment Programme (WWAP) aims at the development of the instruments and competence to improve the understanding of the main processes, the management practices and the policies that will help improving the quality and supply of fresh water on the planet. The World Water Development Report is the main component of the United Nations WWAP, and use case studies as a testing ground for new methodologies that will be examined in terms of the 11 challenge areas : governing water wisely, meeting basic needs, securing the food supply, protecting ecosystems, sharing water, managing risks, valuing water, improving the knowledge base, water and energy, water and industry, water and cities.

### FAO's Land and Water Development Division (AGL)

The Service is concerned with sustainable use and conservation of water in agriculture. It assesses water resources and monitors agricultural use; assists in water policy formulation and promotes irrigated agriculture and efficient water use through management innovations, modernization and institutional reforms. The programmes and activities of the Service include development of water resources through small scale irrigation and appropriate water control technologies; best practices for sustainable water use and conservation and the avoidance and mitigation of adverse environmental effects of water development.

Activities:

1. Creates awareness and contributes to the international debate on food security, sustainable water development and resource conservation.
2. Cooperates with UN and specialized agencies, international and national bodies in the fields of activity of the Service.
3. Promotes appropriate water policy and integrated water management in river basins including information sharing and conflict resolution in shared river basins.
4. Promotes an integrated and multi-disciplinary approach to water management, taking account of major land-water interactions including mechanisms to ensure benefit sharing of all stakeholders.
5. Promotes efficient use and conservation of water in agriculture through improved irrigation and water harvesting technologies, effective crop water management and training.
6. Develop appraisal tools and specific measures for wetland development and conservation.
7. Supports irrigation systems improvement and modernisation, through institutional reforms, technical innovations, management tools and capacity building of the technical staff and managers of irrigation systems and water user associations.
8. Advises on water logging and salinity control including information sharing through networks and newsletters.
9. Advises on standards and guidelines on water quality management, safe use of wastewater, mitigation of environmental effects and mitigation of health hazards related to water development.
10. Promotes improved preparedness and national planning to recurrent droughts, floods and climate variability.
11. Maintains a database on rural water use and is a recognised point of reference on the state of land and water for food and agriculture in the world through the water information database (AQUASTAT). Contributes to the World Water Development Report.
12. Acts as a reference centre, maintains Internet based information systems and provides question and answer service on important water issues to guide effective planning and sound management of water resources.
13. Supports member countries in the formulation and implementation of water policies and water development projects including SPFS and emergency and relief operations

### Aquastat

This is a global information system about the use of water for agriculture and in rural regions. AQUASTAT's main objective is to provide users with comprehensive information on the state of agricultural water management across the world, with emphasis on developing countries and countries in transition.

## **b). The World Bank, global**

### The GEF - *Global Environment Facility*

Established in 1988 and managed by UNDP, World Bank and UNEP, the GEF resources are implemented in actions related to climate change, biodiversity, international waters and the ozone layer depletion. The activities related to the degradation of the earth, such as desertification and deforestation, can also receive financing as long as they are related to the four main areas. GEF works in initiatives related to water worldwide, in 2 operative programmes:

1) Water bodies (integrated land and water projects): Underlines the regeneration of the damaged systems. In particular, the projects included in this component envisage the integrated management of freshwater river basins and coastal areas as a key factor of sustainable future. The aim is to help countries to modify human activities in several sectors so that water bodies and their corresponding multinational river basins are used in a sustainable way. \$ 75-90 million US have been donated in the period 1998 - 2000. The GEF can assist in the realisation of the following actions:

- a) to produce a transboundary diagnosis analysis in order to identify high priority transboundary environmental problems.
- b) to produce a strategic action plan to describe the measures that must be adopted by each country in order to face these problems (including a distinction between the agreed basic measures and those complementary) and to mobilise non-GEF resources for both kinds of actions.
- c) to help financing the increasing costs of the technical assistance, the strengthening of the capacity, a number of demonstrations and some investment necessary for facing high priority transboundary problems.
- d) to promote the use of new scientific methods and technologic innovations appropriate for management.

2) Water pollutants: The operational programme on pollutants underlines the prevention of damages to threatened waters. Budget for period 1998-2000: \$ 100 million US approx. .

Two GEF projects on water management in the region have been “*Preservation of brackish ecosystems and Mediterranean coasts*” (Albania, Egypt, Lebanon, Morocco, Palestine Authority and Tunisia) and “*Determination of Priority Actions for the Further Elaboration and Implementation of the Strategic Action Programme for the Mediterranean Sea – Regional*”, (Albania, Algeria, Bosnia and Herzegovina, Croatia, Egypt, Lebanon, Morocco, Slovenia, Syria, Tunisia and Turkey) which is focused on combating pollution hot spots, and not on integrated basin management.

## **c). European Union Policies and Instruments**

### The Water Framework Directive

Approved in September 2001, this is the main obligatory-policy provision in our region for water management integration with environmental and ecosystem criteria, but it affects only the EU member states (France, Greece, Italy, Portugal and Spain). Some of its guidelines are: the integrated management by river basin (regardless of administrative or political divisions), and the protection of resources, by means of economic, financial and social instruments. Water is not only considered a resource, but also an economic good.

Its *General aims* are to set up a framework for the protection of continental surface water, transition water, coastal water and groundwater of the EU in order to:

- prevent further deterioration; to protect and to improve aquatic ecosystems, and to cover water needs of terrestrial ecosystems and wetlands directly dependent on aquatic ecosystems.

- promote the sustainable use of water, based on the long-term protection of the available water resources.
- contribute to palliate the effects of floods and draughts.

*Its Environmental aims:*

- to prevent the deterioration of the ecological status and the surface water pollution; to regenerate them in order to reach a good ecological and chemical status for these waters, and to reach a good potential ecological status for very modified and artificial water bodies.
- to prevent the deterioration and to recover groundwater bodies.
- to achieve the enforcement of all the regulations and aims concerning protected regions at the latest 16 years after the entry into force of this Directive.

The Directive requires the drawing up of a basin hydrological plan for each river basin district. Prior to this, the following steps must have been taken: a study on impacts of human activity on the status of surface water and groundwater and an economic analysis of water consumption. Furthermore, it states that *"the member states will ensure, at the latest in 2010: that the policies on water pricing include appropriate incentives so that users make an efficient use of water resources; a suitable contribution of the economic sectors (at least industry, household consumption and agriculture must be distinguished) to the recovery of water-related costs, based on the economic analysis made according to Appendix III, and particularly according to the principle that the polluter should pay."*

Transfers between basins should be limited to emergency situations. The Directive also imposes the command to grant active participation of the entire public (users included) in each river basin district in order to obtain feedback. Therefore, it clearly encourages the participation of the civil society.

If countries like Slovenia, Cyprus and Malta (and possibly Turkey at a later stage) finally become member states of the European Union, this directive should also apply to them.

### LIFE

LIFE is the financial instrument supporting the Community environmental policy. Adopted in 1992, the first phase of LIFE covered the period 1992-1995. A revised regulation, LIFE II, was adopted in 1996 for the period 1996 to 1999. LIFE III covers the period 2000-2004, and it was adopted in June 2000. Its budget is 640 million Euros. LIFE aims at co-financing actions in both in nature conservation (LIFE-Nature) and in other fields of the environment (LIFE-Environment), as well as specific environmental actions outside the European Union (LIFE-Third Countries).

a) LIFE-Environment (for EU member states) holds 47% of the total LIFE budget and finances innovative pilot and demonstration actions aimed at:

- the integration of environmental considerations into land use development and planning, including in urban and coastal areas
- the promotion of the sustainable management of groundwater and surface water
- the minimisation of environmental impact of economic activities
- the prevention, recycling and sound management of waste streams

b) LIFE-Nature: works in the European Union member states plus Slovenia. In practice, LIFE-Nature must contribute to the implementation of the Birds and Habitats Community Directives, and particularly to the creation of a European network of protection areas.

It cannot be directly implemented in the integrated river basin management.

c) LIFE-Third Countries focuses on technical assistance actions to be implemented in third countries bordering the Mediterranean and the Baltic, including Jordan. It only has 6% of the total LIFE budget. It aims at the creation of administrative capacities and structures necessary in the environmental field, and the development of policies and action programmes regarding the environment. In relation to programmes affecting river basins, it has financed projects, for example, for METAP (for the execution of Environmental National Action Plans), MEDWet, Blue Plan (project: Indicators for sustainable development in the Mediterranean region) or an Agenda 21 for the river basin of North-eastern Tunisia.

## **ANNEX 2**

### **INTERNATIONAL AND MULTILATERAL POLICIES, INSTRUMENTS AND PROGRAMMES WITH SPECIFIC FOCUS ON THE MEDITERRANEAN REGION**

The widely acknowledged strategic importance of water in the Mediterranean is shown by the existence of numerous international, regional and multilateral organisms working on the subject. The World Bank and the European Union are the major donor organisms. But so far, it seems that the greatest emphasis is put on the use of water for agriculture, rather than on a sustainable use of water and the integrated management of river basins.

There are several pan-Mediterranean agreements, for example, the Genova Declaration (1985), the Nicosia Charter (1989), and the Agenda 21 for the Mediterranean (Tunisia, 1995), the latter creating a Mediterranean Committee for Sustainable Development (1996). The Convention to Combat Desertification includes an appendix devoted to the northern Mediterranean region.

In the 1990s, other pan-Mediterranean initiatives were launched, for example, the MedWet -programme for Mediterranean wetlands- (EU and Ramsar Convention), the WWF-International's Mediterranean Programme, the NGOs network MEDForum and the MEDCOAST initiatives about Integrated Coastal Management.

### **Mediterranean Water Network (MWN):**

It was founded in 1993 by Government Representatives from the water sector of 15 countries of the Mediterranean Basin<sup>5</sup> (generally represented by the Secretary Generals of water resources). It is financed by the EU and the World Bank (WB).

Its general aims are:

- To promote the development of technology in matters concerning water in the countries of the area.
- To exchange information on such aspects as resources and water demand assessment, planning methods and techniques, administration of water resources, legislation and regulations.
- To encourage the preparation of programmes and plans for joint action.
- To contribute to integrated water management and to ensure the appropriate financial resources to develop joint projects.

In order to reach its aims, several working groups have been created. One of them addresses irrigation prospects by trying to:

- ✍ Modernise agriculture technologies and organisations in order to obtain higher performance.
- ✍ Intensify water saving by introducing cultures needing less water.
- ✍ Envisage conventional infrastructures for water.
- ✍ Encourage making final users aware of the problem.
- ✍ Provide farmers with training and information on environmentally sustainable techniques and practices.

### **The Barcelona Convention**

The Barcelona Convention, with its 5 protocols, is plurithematic. It acts by means of the Mediterranean Action Plan (MAP/UNEP). The MAP concentrates mainly on topics related with pollution. Nevertheless, it also coordinates regional activity centres (RAC) on other matters, such as marine and coastal biodiversity and protected areas (RAC/SPA), integrated coastal zone management (RAC/PAP), and

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<sup>5</sup> Albania, Algeria, Croatia, Cyprus, Egypt, France, Italy, Jordan, Libya, Malta, Morocco, Slovenia, Spain, Tunisia and Turkey.

databases and scenarios for the Mediterranean environment and development (Blue Plan). Furthermore, in 1995, the parties in the Barcelona Convention adopted the Agenda MED 21. Since 1996, the Mediterranean Commission on Sustainable Development has been in charge of its follow-up.

### **The Mediterranean Action Plan (MAP-UNEP)**

Works on 3 axes:

1. Institutional and legal. It comes from the Barcelona Convention for the protection of the Mediterranean Sea and its current 6 protocols.
2. Scientific. Its result is the Programme for continuous monitoring and research on sea pollutants (MED POL).
3. Socio-economic. It focuses on the perspectives and the environmental priorities of bordering countries by means of a systematic approach, the launching of the Regional Activity Centres of the **Blue Plan**, and the Priority Actions Programme.

The Blue Plan proposes and measures two kinds of indicators: indicators for the sustainable development in the Mediterranean (some of these are directly related to water, consumption and recovery, e.g.: exploitation rate of water renewable resources, production rate of non-sustainable water) and indicators of environmental "performance" (this one operates in 13 Mediterranean countries or regions benefiting from the METAP and tries to measure the variance between actual data and the quantified environmental aims set up by the Protocols-. Among its 4 priority topics water management and water supply, and water pollution are included.

The Agenda 21 for the Mediterranean

Agreed in Tunis (1994) by all the Contracting Parties to the Barcelona Convention, it proposes the integrated management of water resources based on the perception of water as an integral part of the ecosystem, a natural resource, and a socio-economic good, the use of which must depend on its quality and quantity. In order to do this, water resources have to be protected, taking into account the way ecosystems work and the perennial nature of the resource. In this way, an attempt has to be made to satisfy the different water needs of human activities.

The Agenda 21, in its section 18.8. *"Integrated Water Resources Management"*, states: *"Integrated water resources management is based on the perception of water as an integral part of the ecosystem, a natural resource and a social and economic good, whose quantity and quality determine the nature of its utilisation. To this end, water resources have to be protected, taking into account the functioning of aquatic ecosystems and the perennality of the resource, in order to satisfy and reconcile needs for water in human activities. In developing and using water resources, priority has to be given to the satisfaction of basic needs and the safeguarding of ecosystems. Beyond these requirements, however, water users should be charged appropriately"*.

### **The Mediterranean Commission for Sustainable Development (MCSD).**

The MCSD is a consultative body of the MAP in which the contracting parties and the civil society meet:

- 21 experts, usually officials from the ministry of the environment of the bordering countries (Albania, Algeria, Bosnia and Herzegovina, Cyprus, Croatia, Egypt, Spain, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Morocco, Monaco, Slovenia, Syria, Tunisia, Turkey) and by the European Union.
- 15 representatives of the Civil Society (5 NGOs, 5 representatives of the socio-economic area and 5 local authorities).

Its role is to give advice, to analyse, and to elaborate proposals. Its general aims are: reviewing the progress in the execution of the Agenda 21 for the Mediterranean; and reviewing financing mechanisms.

Among its 8 priority issues, each dealt with by a particular Working Group there is one dedicated to the sustainable management of water needs. In the period 2000-2001, the 15 representatives of "civil society" in the **MCSD** (advisory organ of the MAP) were:

- ? NGOs: WWF, MEDWET, ENDA-Maghreb, MED-Forum, MEDCOAST
- ? Representatives from the socio-economic sector: AIFM, IME, MEDENER, EOAEN, FEI
- ? Local authorities: MedCités, IFOCC/ULAI, Municipality of Calvià, Municipality of Tripoli, Municipality of Naples

In 2001, the MCSD elaborated *Strategic review for sustainable development in the mediterranean region* that helps the political decision-makers like tool to shape and adopt a regional sustainable development strategy in Mediterranean, including the river basin management.

## **EUROPEAN UNION POLICIES AND INSTRUMENTS FOR THE MEDITERRANEAN REGION**

**The Turin Declaration** of the Euro-Mediterranean Ministerial conference on local water management on 18-19 October 1999, Turin

This Ministerial Declaration reasserts and completes the principles and areas for action of the Rome Mediterranean Charter for Water of 1992 and the Marseilles Declaration of November 1996 by the following points:

1. The importance of water resources in social, economic and environmental terms needs to be acknowledged at all levels and integrated into sustainable development policies;
2. Decision makers, institutions, water managers and users should be aware of the interaction and complementarity of their roles and encourage the development of a "culture system" directed to water that aims to change behaviour in order to achieve sustainable water management;
3. Good co-ordination, complementarity and synergy among existing organisations and activities in this field are indispensable;
4. A participatory approach should be encouraged that involves the civil society, including water users and organisations at local, regional, sub-national and national level;
5. Greater priority should be given to sustainable water demand management within the framework of integrated water policy;
6. Water scarcity could be alleviated through mobilisation of non conventional water resources, such as reuse of wastewater or desalination, and sustainable methods of rain stimulation, whenever justified;
7. Improved water management in urban and rural areas, especially disadvantaged ones, needs special attention in order to provide access to clean water and to avoid inefficient use;

### **EU-SMAP (Short and Medium-term Priority Environmental Action Program for the Mediterranean Sea)**

A framework programme that mainly uses MEDA funds. It works on five aspects, one of them being integrated water management, considered as an essential feature for environmental protection and sustainable development in the Mediterranean basin.

Following the approach adopted in the Euro-Mediterranean Conference on water management, celebrated in Marseilles, actions aimed at promoting sustainable water resource management must be supported by a global and integrated approach, allowing the anticipation of problems and dealing with the offer growth and diversification, as well as the sustainable management of water demand.

The most urgent measures of this sector are the following:

- evaluation and continuous vigilance of water quality and quantity;
- evaluation of potential (available and new) resources, particularly in critical regions (densely populated regions or characterised by strong seasonal demographic variations, mostly due to tourism);
- Establishment of water conservation plans, including flow control techniques, techniques for highland soil conservation and for conduct dredging.
- Protection of water reservoirs and wetlands and, if necessary, establishment of management plans for river basins and water catchment areas.
- Identification and use of measures and techniques for: (1) implementing the catchment, processing, disposal and re-use of urban and industrial waters, sludge and rain-water, including the construction of infrastructures for the processing of urban effluents; (2) preventing salinisation and treating salinised waters.
- Establishment and implementation of programmes aimed at reducing water losses –including the improvement of existent networks, leak detection, preventive management, cartography and training– and development of techniques to reduce the use of water for irrigation.

- Support to non-centralised authorities (basin committees –if existing–, local agencies responsible for water management, etc.), by means of gathering together both consumers and local communities, based on the distribution of responsibilities, and by using appropriate measures to modify non sustainable production models and the use of water so that integrated water management is encouraged at local level.

#### **MEDA:**

It is the main financial instrument of the SMAP program. There are 12 Mediterranean countries benefiting from this European cooperation programme with the Mediterranean: Morocco, Algeria, Tunisia, Malta, Cyprus, Turkey, Egypt, Jordan, Israel, Syria and the occupied territories of Gaza and the West Bank.

In the environmental area, there are several choices: integrated water management, waste management, polluted or protected areas (hot spots), integrated coastal zone management and the strategy to combat desertification.

In its indicative programmes, some countries have included integrated water management. One example is Morocco in MEDA II, with 120 million Euros intended for the adjustment of the water sector, including actions on drinking water or irrigation. The main objectives of these programmes are: launching Basin Agencies; regulating the different water uses (especially water for agriculture); protecting water resources and developing public-private partnership.

#### **Semide:**

Euro-Mediterranean Information System about the know-how of water management. It is a partnership project that allows its 27 members (signatories of the Barcelona Convention) to create an informatic structure to ensure specialised contacts on water resources, exchange of specialised informations, and the implementation of specific methodologies. It has a 2.5 million Euros.

#### **Line 6200-Environment in developing countries**

Created in 1992, applies to Mediterranean developing countries. The priority topics for 2000-2001 are:

- the assistance to developing countries for the implementation of their international obligations regarding multilateral environmental conventions (LCD, CBD, CC).
- Support for the implementation of the sustainable development concept in specific sectors of development cooperation.
- The integration of environment in the Commission's development cooperation.

Projects related to integrated basin management complying with international conventions are absolutely valid for this budget line.

## **THE WORLD BANK IN THE MEDITERRANEAN**

### **METAP - Mediterranean Environmental Technical Assistance Program**

The METAP was established in 1990 to cope with and reduce the effects of environmental degradation in the Mediterranean region. Until 1995, METAP's first two phases mobilised over US\$32.0 million in activities that identified investment projects, strengthened capacity in national and local environmental institutions, promoted sustainable environmental policy actions, and created the first professional networks in the region. The METAP III (1996-2000) is financed by the EU and the EIB (28,5%), the UNDP and the WB (16,5%), and 10% from other donors Switzerland, Japan, Canada, Luxembourg and Italy) and its approximate total budget comes to US\$30 million.

One of the 3 METAP guidelines is "Integrated Water and Coastal Resources Management".

Partner countries (beneficiaries) of the METAP are Albania, Algeria, Croatia, Cyprus, Egypt, Jordan, Lebanon, Morocco, Slovenia, Syria, Tunisia, Turkey, the Gaza Strip and the West Bank. Additionally, Egypt has provided office space in Cairo.

At the request of the European Commission, METAP has started the RF (Regional Facility) consisting of two autonomous units: the Project Preparation Unit (PPU), which focuses on preparing investment projects and jointly managed by the Bank and EIB, and a Capacity Building Unit (CBU), which focuses on national and regional capacity building activities, and is managed by UNDP Agenda 21. The CBU manages a Regional Capacity Building Program (RCBP) focusing the following activities:

- Building Regional and National Capacity in Hot Spots (MED-BRANCH), completed in 1998. This pilot effort worked to build capacity of stakeholders in environmental hot spots in the region and to initiate policy dialogues on key themes such as urban environmental management and planning, and water legislation. It was managed by UNDP-Regional Bureau for Arab States through the METAP RCBP, which is based at the METAP RF. It was technically supported by the International Academy for the Environment, an NGO, in Geneva.

- Program Performance and Monitoring (PPM) is an environmental monitoring system comprising a framework of specific indicators related to the METAP priority themes intended to assist countries to monitor their progress towards meeting environmental objectives. The Blue Plan of the Mediterranean Action Plan (MAP) is implementing the national and project environmental performance indicators (EPI) components under the supervision of the UNDP - RBAS RCBP Staff at the PPU.

The METAP EIA Initiative will help METAP countries to acquire the necessary technical and policy tools to establish credible and operational Environmental Impact Assessment systems. This initiative is technically supported by the EIA Centre at the Victoria University of Manchester, UK under the supervision of the UNDP - Capacity 21 CBU staff.

The NGO Small Grants Facility (SGF) provides grant support for small-scale innovative activities that support the METAP priority themes and are initiated by community-based and NGOs. The SGF is active in Turkey, Algeria, Jordan, and Lebanon, implemented through the joint efforts of the UN Resident Missions in the four countries and the Bank.

The METAP III programme has been affected by two limiting factors:

- The considerable mismatch between the funds actually made available for project studies and the ambitions flagged up in 1995, which served as a basis for mobilizing the countries (around 30 and 120 million dollars respectively)
- The programme studies produced by METAP have not always been followed by preparation of feasibility and investment studies for related projects.



### **ANNEX 3.**

## **MEDITERRANEAN FORA AND INVOLVEMENT OF CIVIL SOCIETY**

There is a long list of NGOs, scientific and technical groups, professional and other associations working on water management issues around the Mediterranean. Most significantly, there are several Fora in which civil society participates jointly with international and national institutions.

### **Organisations of the civil society**

#### **a). Main NGOs**

##### **WWF and WWF-Mediterranean Programme**

In 1995, WWF International set up a Programme for the Mediterranean based in Rome. It participated very actively in the process of revision and update of the Barcelona Convention, particularly the new SPA Protocol and its follow-up. Currently, it coordinates the conservation activities of three priority biomes (coastal and marine, forests, and freshwater) and those related to horizontal topics, such as capacity building and communications. Since 1994 they coordinate the “Across the Waters” project for capacity building and training of Mediterranean NGOs, one of whose results has been the Mediterranean Directory of Environmental Organizations with over 2000 environmental organisations in our region. WWF counts with over 400.000 individual members around the Mediterranean, with a solid structure of national, subnational and programme offices in France, Greece, Italy, Portugal, Tunisia, Turkey and Spain.

Through its European Programme, WWF has elaborated the Water and Wetland Index (WWI) measuring gaps and weaknesses in the implementation of policies on water and wetlands in 16 European countries, including Turkey. The method measures, first, the quality of the data available (parameters, accuracy of data, disponibility, possibility to compare with other data sets..). Only when the data quality was good enough it was used to value its compliance with the EU Water Directive, e.g. on river fragmentation, threatened species, preassures on water quality and quantity, and knowledge about their causes. Preliminary results show that the southern European countries rank with the lowest scores, and do not meet the expected standards in any case.

##### **MIO-ECSDE:**

The Mediterranean Information Office for Environment, Culture and Sustainable Development is a Federation of Mediterranean NGOs. It is a technical and lobbying platform based in Athens. MIO-ECSDE cooperates closely with the European Commission, MAP/UNEP, UNESCO and other international and regional governmental organisations (UNDP, IFAD, METAP, World Bank, EIB) and in work groups, federations and scientific forums (EEB, RAED, FoE, WWF, RAMSAR, MED Forum, CIESM, MEDCITIES, MEDMARAVIS, MEDPAN, MEDWET, IUCN, GWP MED/TAC, CREE, etc.). MIO-ECSDE focuses, among other issues, on sustainable water management for agriculture as a Euro-Mediterranean priority, defending the following position (June 2001): it must make visible and clear the links between sustainable water management and sustainable agriculture, and both policies should ensure regional food security, viable rural livelihoods and management of rural ecosystems as well as adequate quantities of good quality water in the region for the present and future generations.

##### **Med Forum:**

This Network, created in 1995, involves 115 NGOs from 23 Mediterranean countries around the Mediterranean. It focuses on conservation and sustainable development. Among their priorities, as submitted to the II World Conservation Congress (Amman, Oct. 2000), some include a view to attain an integrated and sustainable water management, such as demanding hydrological plans, integrating an ecosystem view in the water cycle management, water pricing reflecting its real costs and the risk of exhaustion of the resource in all sectors, especially in agriculture.

##### **European Environmental Bureau (EEB):**

Based in Brussels and made up of 134 NGOs from 25 countries, it works on environment and the protection of nature. It has consultative status and is related to the Council of Europe, the Commission of

the European Union, the European Parliament, the Economic and Social Committee of the European Union, the OECD, and the United Nations Commission on Sustainable Development.

## **b). Scientific and Technical**

ICID (International Commission on Irrigation and Drainage) is a scientific and technical NGO, made up of members from 88 countries, and a member of the *Global Water Partnership*. In the Mediterranean Basin, there are members from Algeria, Cyprus, Egypt, Slovenia, Spain, France, Greece, Israel, Jordan, Morocco, Portugal, Syria and Turkey. Some countries have formed National Committees. It is a member of the *World Water Council WWC*, which presented a *Long Term Vision for Water, Life and Environment in the 21st century* in the Second World Water Forum, held in The Hague in 2000, from three different points of view: Water for people, Water and nature, and Water for food and rural development. The ICID has a consultative status in the United Nations Economic and Social Council (ECOSOC), in UNESCO, in WMO, and in FAO. It has also worked with the World Bank and the UNDP, in the *International Programme for Technology and Research in Irrigation and Drainage (IPTRID)*.

CIHEAM (International Centre for Advanced Mediterranean Agronomic Studies).

Founded under the auspices of the Council of Europe and the OECD in 1962. It currently has 13 Member Countries: Albania, Algeria, Egypt, Spain, France, Greece, Italy, Lebanon, Malta, Morocco, Portugal, Tunisia and Turkey. It has four Mediterranean Agronomic Institutes (MAI) situated in Bari (Italy), Chania (Greece), Montpellier (France), and Zaragoza (Spain). The Centre is directed by a Governing Board, which includes one representative from each Member Country. Besides the OECD and the Council of Europe, the FAO, the European Union, and the AOAD participate in the meetings of the Governing Board. Some of CIHEAM's institutional objectives -town and country planning, water resource management- are carried out by the MAIB CIHEAM Centre in Bari (Italy).specialised in irrigation agriculture.

IWMI International Water Management Institute)

A scientific research organisation focused on water management for agriculture and water needs for developing countries.

There is a Chair of the Dialogue on Food and Environment)

IME Institut Méditerranéen de l'Eau: Created in 1982, in 1998, the Global Water Partnership entrusted it with the animation, coordination and technical assistance of the MEDTAC (Mediterranean Technical Assistance) (see ahead)

## **c). Other associations**

CEDARE (Centre for Environment and Development in Arab Region and Europe) is an intergovernmental organisation with focal points in the Ministries of Environment in the Arab and Mediterranean Europe countries. Established to assist the region in its efforts to pursue global environmental trends and support national efforts in the implementation of Agenda 21, by fostering their national capacities. CEDARE is 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. Its main mission is capacity building of its member countries, promoting skills in environmental management, transfer of technologies, environmental education and development of environmental policies. CEDARE also facilitates inter-country cooperation and exchange of information and experience through its Land & Water Resources Management Programme.

MED-HYCOS Is the first regional component of the WHYCOS Programme to be put in operation. In the Mediterranean basin, MED-HYCOS focuses on contributing to water resources assessment and management by helping the national hydrological services to strengthen their capacities and by promoting exchange of information and skills among the countries participating in this project.

Users associations (e.g. irrigators)

The creation of a Mediterranean Confederation of Irrigators Associations is projected by national irrigator's associations of France, Greece, Lebanon, Turkey and Spain. The Spanish Federation of Irrigators does not support the European Water Framework Directive as they consider it may cause the abandonment of an important part of the irrigated surface.

## **Fora and Networks**

### **a). Global Water Partnership and MEDTAC**

Established in 1996 under the initiative of the World Bank, the UNDP and the SIDA (Swedish International Development Agency), the Global Water Partnership is an international network of organisations and institutions interested in the development and administration of water resources. They are inspired by the Principles of Dublin and the Earth Summit. Its goals are:

- To clearly establish the principles of sustainable management of water resources.
- To support actions that bolster the principles of sustainable management of water resources in the local, national or river basin areas.
- To identify deficiencies and to foster definition of critical needs within the framework of available human and financial resources.
- To provide help in relation with the identified needs, by favouring measures according to the availability of resources.

In the Mediterranean basin, the GWP organises a technical Committee, the MEDTAC (Mediterranean Technical Assistance Committee), comprised by 7 institutions or networks (CIHEAM-Bari, CEDARE, METAP, IME, MIO, MWN, Blue Plan-MAP/UNEP) which work in the following areas:

- Establishing on the ground partnership and supporting established alliances
- Developing awareness and changing attitudes towards water management
- Generating and disseminating knowledge about Integrated Water Resources Management good practices and supporting dialogue on key results
- Completing regional Plans of Action and prioritising actions, and
- Identifying and supporting specific studies.

Some of the specific topics focused by MEDTAC are water conservation, educating children about water, groundwater management, drought management, and the interaction of water, food and the environment.

### **b). MEDWET (Mediterranean Wetlands Initiative)**

A program for the establishment of cooperation networks for wetland conservation, learning, training and management, was started in 1993 within the framework of the initiatives of Ramsar Secretariat. A Medwet-II set of activities was launched in 1998 under the aegis of the Mediterranean Wetlands Committee. Medwet is integrated by 25 Mediterranean governments, international institutions and non-government organisations; it includes the European Commission, intergovernmental Agreements, United Nations agencies (Barcelona/UNEP; Council of Europe/Berne; Ramsar; UNDP), NGOs (BirdLife International, IUCN, Wetlands International, WWF International) and the wetland centres -Greek Biotope/Wetland Centre (EKBY), Station Biologique de la Tour du Valat, in France, and the Sede para el Estudio de los Humedales Mediterráneos (SEHUMED), in Spain. Recognising the close linkages between wetland conservation and river basin management, during its 3<sup>d</sup> meeting in Djerba (Tunisia, 2000), Medwet accepted a proposal (from IUCN) consisting in undertaking a project in order to design the guidelines of integrated river basin management. Medwet also recommended to fully take into account the guidelines adopted during the COP7 of Ramsar account (Resolution VII.18, *guidelines for integrating wetland conservation and wise use in river basin management*, mentioned above in this document).

(see Annex 4 for more information on MedWet)

### **c). EUREAU** (European Union of National Associations of Water Suppliers and Waste Water Services):

Association that gathers public and private institutions of the 15 Member States: National Associations, Water Supply Associations and Waste Water Services, among others. It defends the river basin as the management unit for sustainable water management.

#### **d). MEDRAP** (Mediterranean Regional Action Programme to combat Desertification)

The Convention to Combat Desertification, into force since the 1<sup>st</sup> of June 1996, urges all the signatory countries affected by desertification to set national, subregional and regional Action Programmes. On the other hand, reports from the European Union on "Desertification in the Mediterranean" have underlined the need to coordinate and harmonise the policies of these countries. The reason for this is that although they have similar needs, they have adopted different approaches. Therefore, it is essential to consider whether it is possible to integrate the different solutions proposed in the common integrated policies, specially as far as general strategies, action stages and surveillance are concerned. For this reason, the EU has created the MEDRAP, which will be in operation for three years, starting on the 1<sup>st</sup> of January 2001. By means of a participative approach, the MEDRAP aims at these specific objectives:

- to determine the current status of knowledge concerning desertification, by evaluating the impact of the activities and of planning policies in the threatened regions.
- to establish priorities, as well as space and time strategies, to implement measures to prevent and attenuate; and to improve the sustainable management of lands.
- to determine targets, as well as scientific, institutional and political opportunities, and to propose adapted solutions.

With a view to reach these objectives, a wide telematic network will be established. This will foster the exchange of information between the scientific community and the agents (focal points of the CCD, institutional agencies, NGOs) involved in the management of land at all levels. Furthermore, 5 thematic workshops will be organised:

- sustainable management of soil and water resources;
- political and socio-economic aspects of desertification
- identification of fragile areas;
- prevention and attenuation;
- design of regional strategies

Results are expected to become guidelines, recommendations and strategies proposed to the national focal points for the design of the Regional Action programme against Desertification.

#### **e). Dialogue on Water, Food and Environment**

After the world meeting in Colombo, Sri Lanka (Dec.2000), 130 participants and 10 sponsoring organisations (FAO, GWP, ICID, IFAP (Int'l Federation of Agricultural producers), IUCN, IWMI, UNEP, WHO, WWC, WWF) concluded about the need of greater dialogue between agricultural and environmental sectors to develop a shared vision on water management. This "Dialogue on Water, Food and Environment" includes 3 main elements:

- A real process of dialogue between actors at global, national and local levels, open, transparent and inclusive. At the global level, a yearly forum called by FAO is expected; at the local level the political challenge is to include the real users of water.
- A knowledge bank to sustain dialogue with accurate, solid, convincing information. This bank would comprise food security and natural environment, and would include a series of thematic studies allowing for a global evaluation of the subject.
- A network of field projects at local levels and river basins, implementing innovative focuses and solutions improving the sustainability of water provision for agriculture and for nature. It would be a platform to exchange best practice.

For the dialogue, "agriculture" includes all means of food production including ranching and aquaculture, and "environment" includes water quality and ecosystem functions (land and freshwater) and biodiversity including fisheries. It is foreseen that the Dialogue will be a decentralised process lasting several years, with milestones in the 3<sup>d</sup> and 4<sup>th</sup> World Water Forums in Kyoto and Montreal. A Secretariat has been established for the Dialogue. Its last meeting took place in Bonn, 1-2 December 2001.

## **f). International Water Office**

Cooperation agencies, national ministries, river basin agencies, territorial colectivities, universities and research centres, professional groups, water dealers, related businesses and NGOs are part of the 149 member organisations of this Office intended to put together all public, social and private water organisms involved in water management in France, in Europe, and worldwide.

## ANNEX 4

### Mediterranean Wetlands Initiative

**MedWet** is a coordination mechanism for wetland activities in the Mediterranean Basin. It owes its origins to an international conference organized by the International Waterfowl & Wetlands Research Bureau (IWRB) [now Wetlands International] in Grado, Italy, in February 1991. The MedWet1 project (1992-1996), funded by the European Union and involving the five EU member states in the Mediterranean (France, Greece, Italy, Portugal, Spain), began building the collaborative MedWet network and developed regional methods and tools.

As part of MedWet1, the **Mediterranean Wetlands Strategy** was developed by the eleven participating partners (Ramsar Bureau, the EC, 5 EU-member states, and 4 NGOs) after wide consultation in the region. MedWet1 culminated in a major Conference on Mediterranean wetlands (Venice, Italy, June 1996), at which the Mediterranean Wetlands Strategy, based on the first global Strategic Plan of the Ramsar Convention, was endorsed.

In the same year (1996), the Ramsar Convention on Wetlands, under whose guidance the MedWet Initiative had been developed, established the **Mediterranean Wetlands Committee**, that meets annually and guides the strategic direction and implementation of the Initiative; it includes representatives of 25 Mediterranean governments, the Palestinian Authority, the European Commission, intergovernmental conventions and UN agencies (Barcelona/UNEP; Council of Europe/Bern; Ramsar; UNDP), non-governmental organizations (BirdLife International, IUCN, Wetlands International, WWF International) and the Wetland Centres **Greek Biotope/Wetland Centre (EKBY)**, **Station Biologique de la Tour du Valat** in France, and **Sede para el Estudio de los Humedales Mediterraneos (SEHUMED)** in Spain.

In 1999 MedWet became a formal inter-regional structure for the implementation of the Ramsar Convention (Resolution VII.20 of Ramsar's COP7) and serves as a model for regional wetland cooperative structures elsewhere.

The goal of MedWet is "**to stop and reverse the loss and degradation of Mediterranean wetlands, as a contribution to the conservation of biodiversity and to sustainable development in the region.**"

The eight general objectives of the Strategy address:

- achieving wide acceptance and implementation of Strategy;
- achieving wise use of Mediterranean wetlands;
- improving knowledge and awareness of wetland values and functions;
- reinforcing the capacity of institutions and organisations; ensuring effective management of all Mediterranean wetlands;
- conferring legal protection on major wetland sites;
- strengthening international co-operation and increased financial assistance;
- strengthening collaboration among all involved, governmental and non-governmental, public and private sectors.

MedWet2 (1995-1998), funded by the EU, extended the MedWet approach to five non-EU countries (Albania, Algeria, Croatia, Morocco, Tunisia) and introduced a new element to MedWet's portfolio: the socio-economic aspects of wetlands and their impacts on management.

MedWetCoast (1999-2004) is addressing the conservation of wetlands and management of coastal zone sites in Albania, Egypt, Lebanon, Morocco, Tunisia and the Palestinian Authority, funding from the Global Environment Facility and its French counterpart, FFEM. MedWet4 (1998-2000) has developed twinning of Mediterranean deltas in Egypt, France, Greece, Italy, Spain and Turkey. Other projects in progress include MedWet5/Slovenia on salinas management, development and dissemination of the MW Database 2000 and further work on the MW Database as monitoring and cartographic tool.

As part of its role in providing assistance to Mediterranean countries in their wise use of wetlands, MedWet has developed a wide range of 'tools' and guidance. This 'toolkit' covers: an inventory system including database and mapping protocols, wetland management, participation of local people, training

and capacity building, information and public awareness, use of research results, application of a socio-economic approach.

A handbook series *Conservation of Mediterranean Wetlands*, published by Tour du Valat for MedWet, now covers 10 topics: Characteristics of Mediterranean Wetlands, Functions and Values of Mediterranean Wetlands, Aquaculture in Lagoons & Marine Environments, Colonial Waterbird Nest Site Management, Wetlands and Water Resources, Aquatic Emergent Vegetation – Ecology and Management, Freshwater Fish Conservation, Temporary Marsh Vegetation - Ecology and Management, Salinas and Nature Conservation, and Wetlands and Hydrology.

A further important tool developed by the Initiative is the MedWet Inventory System. This includes five manuals, covering the inventory process, a habitat description system, mapping conventions, a database users' guide and inventory datasheets. Important features of the inventory system are its hierarchical structure (catchments, sites and habitats), which permits users to select data entry at different levels of scale and detail, its availability in multiple languages, and its flexible reporting routines that permit output of standard datasheets e.g. for Ramsar site designation or, for European Union countries, Natura 2000 sites. The methodology and database is becoming widely used both in the Mediterranean and elsewhere, and has been recognised by the Ramsar Convention as a model for use in national wetland inventories throughout the world.

#### **MedWet activities related with the Integrated Management of Water Resources :**

? MedWet membership and active role in MEDTAC (GWP- Med): MedWet was elected member of the Mediterranean Advisory Committee of the Global Water Partnership in May 2000, with the expectation to incorporate biodiversity and wise use aspects in the activities of this Committee. MedWet participated actively in the preparation of key documents and the organisation of a major stakeholders conference on water (Athens, November 2000).

? MedWet participates in Mediterranean Committee on Sustainable Development

? Launching of the MedWet Regions network to develop an Action Programme "to promote the conservation and sustainable use of wetland resources and biodiversity in order to achieve their integrated management", and on the following objectives, in the view of developing regional wetland policies and strategies:

- To collect knowledge and information on wetlands and their functioning at regional, provincial or local scale, through standardized inventories.
- To contribute to maintaining or enhancing the conservation status of wetlands, through integrated management actions and scientific monitoring.
- To promote sustainable activities and the wise use of the natural resources of wetlands.
- To contribute to the capacity building of regional, provincial and local governments, responsible for wetland conservation.
- To improve the technical capacity and training of the management staff of wetlands and of the different actors who intervene in their conservation

? Progress in the refining and dissemination of the MedWet Inventory System.

? Establishment of a memorandum between the Conventions of Barcelona and Ramsar focusing on the MedWet initiative, including:

1. Establishment of guidelines for the sustainable use of wetlands in the region.
2. Preparation, together with the national authorities of the countries concerned, of a project concerning the sustainable and integrated management of the Neretva River and wetlands in that catchment basin, involving Bosnia and Herzegovina and Croatia.
3. Cooperation on technical assistance for the conservation and sustainable use of wetlands in Libya

? Prespa Balkan Transboundary Park : involving Albania, Greece and the FYR of Macedonia, with support from Ramsar / MedWet, UNDP, KfW, WWF and others.

? Contribution to the collaboration between Bosnia and Herzegovina and Croatia on the Neretva River wetlands.

? *SAP-BIO project*, the Strategic Action Plan for Biodiversity is part of a wider GEF project. Its focus is the Mediterranean marine environment and coastal areas, primarily wetlands. The main objective of the

project is to develop - through a participatory approach - a strategy for the conservation and sustainable use of marine and coastal biodiversity. A second one is the coordination of other strategic instruments concerning biodiversity in the region. The third is to prepare a portfolio of project proposals for eventual funding through GEF and/or other donors. SAP-BIO involves 12 Mediterranean countries. It is managed by RAC-SPA.

- ? Wetland Inventory in Albania (Project using the MedWet methodology)
- ? Cultural aspects of wetlands, in development by SEHUMED: Final product will be a MedWet manual.
- ? Encouragement of the development of GEF projects in Syria and Turkey, complementing the MedWetCoast GEF project.
- ? Integrated management of the Soca River, Slovenia, with the Tour de Valat.
- ? Sustainable tourism and wetlands in development by SEHUMED.
- ? Progress on the MedWet Inventory System:

In Greece, an inventory of five selected sites was carried out, using the MedWet method, while GIS was used for the cartography of the sites. In France, the adaptation of the MWD software for the inventory of wetlands of the *Agence de l'Eau Rhône-Méditerranée-Corse* (AE-RMC) is currently under way, with the participation of Tour du Valat and the financial support from AE-RMC, the DIREN Languedoc-Roussillon and Tour du Valat.

For more information visit:

[www.sehumed.uv.es](http://www.sehumed.uv.es); and [www.ramsar.org](http://www.ramsar.org)



## ANNEX 5. EXAMPLES OF NATIONAL POLICIES

**Box 4. The Hidrological Plan and the Ebro river**

**Box 5: Andalucía: the Guadiamar green corridor**

**Box 6: Institutional arrangements in France**

**Box 7: Turkey: water savings and decentralised irrigation management**

**Box 8: Tunisia: integrated water management in a context of scarce water resources**

**Box 9: Tunisia: Ichkeul National Park, a restoration plan.**

**Box 10: Morocco: the Oued Broun river basin. A participative approach in integrated rural development in the province of Taza.**

### **BOX 4: The hydrological Plan and the Ebro river**

The proposed National Hydrological Plan (PHN), a macro-plan with an investment of 20,000 million Euro in 10 years, is based on inter-basin water transfers from the Ebro catchment to coastal Mediterranean regions, and has created many reactions by local stakeholders in Aragon and Catalonia, and in the rest of the country .

Scientists and NGOs, backed by affected governments, stress that such transfers may have significant ecological impacts, among other, in the Delta area (a Ramsar site and IBA of the EU), notably further reducing river sediment loads, creating marine water intrusions, reducing the minimum river flows, and its navigability, and the building of dams in several valleys in the Pyrenees, with a distribution network affecting 18 protected species and 14 habitats of the Natura 2000 network.

Voices from the affected local governments claim water for inland development, denouncing that massive water transfers may further open the development gap and territorial imbalance between arid inland and touristic coastal regions. In fact, the sole announcement of the water transfers has already sparked speculative movements for urbanistic and touristic growth on the coasts of Valencia. Other groups claim that the huge amounts of water to be transferred could be saved at just 25% the costs of the PHN by a full up-dating of the present obsolete and inefficient water distribution network.

The Ebro river basin has a management organism *Confederación hidrográfica del Ebro* which has not been enough to modulate the decision from the Central government and to integrate all points of view. The Ministry of the Environment defends that the Plan follows the EU Water Framework Directive. Nonetheless the regional autonomous government of Aragón (inland affected region) and the civil society country-wide (citizens associations, NGOs, universities experts, syndicalists) were mobilized and have forwarded a demand into the European Commission calling for the application of the spirit of the new EU Directive and asking to take into account the ecosystem values and the approach of "full recovery cost". The demand of Aragón denounces the breach of principles of sustainable development included in the Directive, about the water use for regeneration of natural environment; the use of the irrigation water; the groundwaters, its preservation and the exploitation of aquifers. The EU Directive in fact states that inter-basin transfers must be limited to exceptional cases.

This is an example about the difficulties to integrate river basin management even though a Basin organism exists, if decisions are taken based on nation-wide political criteria before the affected parties and stakeholders have been consulted. This is also a case of how the EU Water Directive of 2001 can be interpreted by different interest groups. The EC needs now to make a decision on whether to co-fund the project.

**BOX 5: Andalucía : The Guadamar Green Corridor - restoration of a polluted small basin with downstream Doñana wetlands**

In April 1998, the retention wall of the tailings dam broke at the pyrite mines, in the municipality of Aznalcóllar. The Agrio and the Guadamar rivers were flooded by a toxic containing sludge and water contaminated with heavy metals. Besides the notoriety attained, due to the seriousness of the mining accident, there was the fact that the Guadamar river is one of the important waterways into the wetlands in the Doñana National Park, a Ramsar site, Biosphere Reserve and World Heritage Site.

From such a perspective, the Guadamar watershed concept opened a new approach for designing and developing the necessary Action Plan against the effects of the mining spill. Essentially because, due to its geographic characteristics, the watershed forms a natural interconnexion system between the Western Sierra Morena mountains and the coastal ecosystems of Doñana. The Guadamar watershed in general and its river network in particular have suffered a strong process of degradation, a serious ecological deterioration of the riverbed and the riparian wetlands, some stretches of which are in deplorable state. Currently, the most important causes of such a situation stem not only from the mining activities but also from the wastes waters coming from the main villages located along the valley, together with the waste water from some agribusiness industries, as well as the almost complete deforestation of the riverbanks for agricultural purposes, reducing the land ecosystems of the watershed to small unconnected fragments.

The regeneration of this basin and the potential creation of an ecological corridor would also satisfy one of the most important claims presented by the different green associations of Andalucía, who regard its implementation as a real means for breaking off the growing isolation suffered by most ecosystems in Doñana. The project of the Guadamar Green Corridor was born with the purpose of providing a bridge connecting both the mountain and coastal ecosystems, as well as the natural and human systems involved in the area.

The Green Corridor Strategy prepared under leadership of the Autonomous Government of Andalucía in a broad participatory process, operated as a new land-use planning scheme, in order to foster both its development and allowing for the implementation of efficient environmental policies which would enhance the wellbeing of all living forms in this area. To this effect the Strategy envisages to:

- Promote the acceptance of the commitments by the institutions and socio-economic agents that are in some way involved in their identification, characterisation and use planning.
- Explore new and more effective techniques to obtain the involvement of various public and private sectors in their maintenance and harnessing.
- Based on the principle of shared responsibility, encourage their diffusion, management and enjoyment by the citizens.

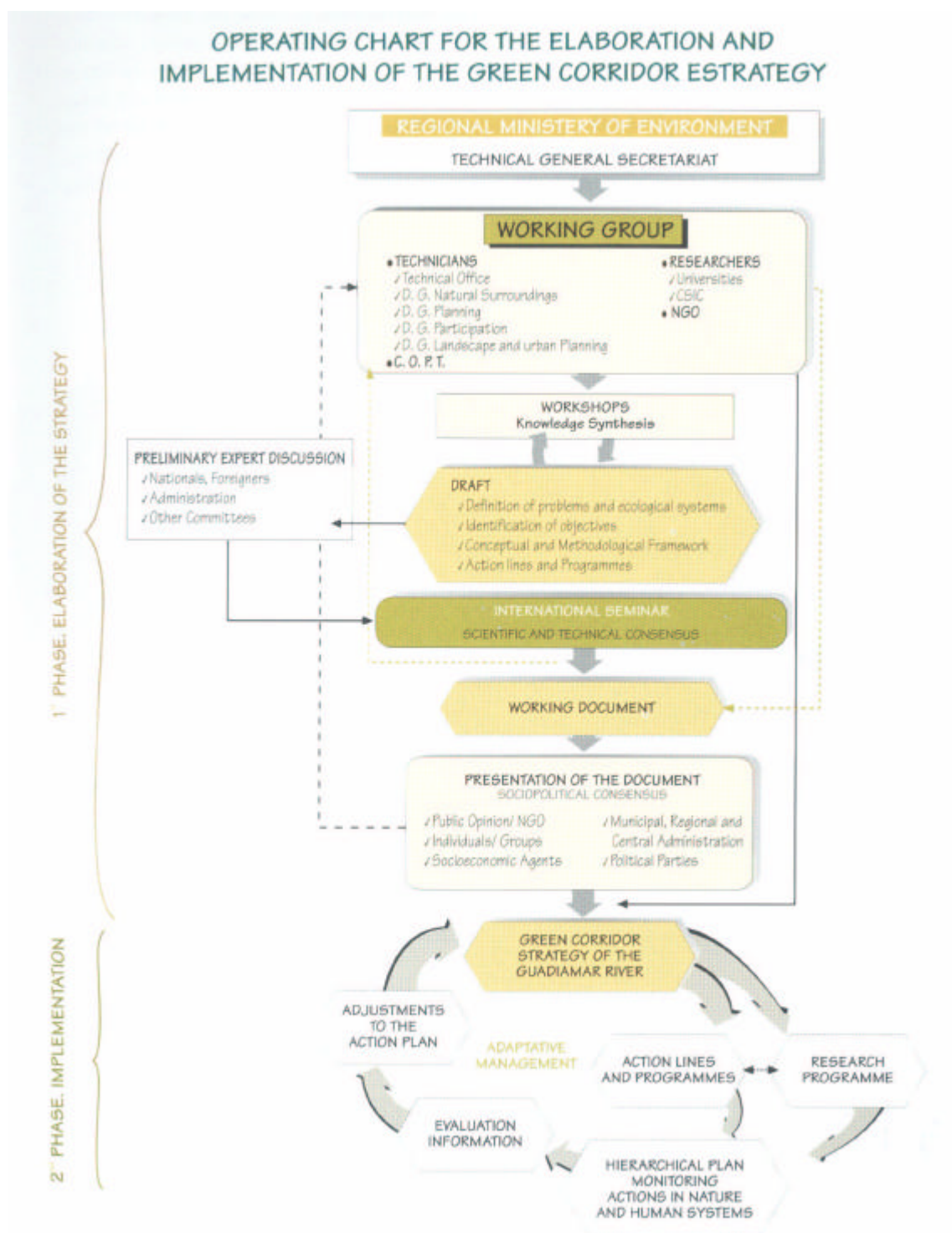
A working groups was established (see chart) to discuss the diagnosis and objectives to solve the situation, drafting a plan then discussed with international experts; a second draft was then produced and circulated for revision and consensus with the main socio-political actors. The plan envisages regular monitoring and evaluation.

The Guadamar is a successful example of river basin regeneration with ecological criteria, promoted from a regional government with full participation of local stakeholders, socio-economic agents, towns, scientists, NGOs, and the National Park authorities

Source: The strategy for the Green Corridor of the Guadamar River, Consejería de Medio Ambiente, Junta de Andalucía, 2000

For more information visit:

[www.cma.junta-andalucia.es/guadamar/indguadamar.html](http://www.cma.junta-andalucia.es/guadamar/indguadamar.html)



Source: The strategy for the Green Corridor of the Guadiamar River, Consejería de Medio Ambiente. Junta de Andalucía, April 2000.

#### **BOX 6: INSTITUTIONAL ARRANGEMENTS IN FRANCE**

The Committees of River Basins elaborated the **SDAGE** (Schéma Directeur d'Aménagement et Gestion des Eaux), approved by the State in 1996. When necessary, Local Commissions of Water (CLE) elaborate the SAGE (Schémas d'Aménagement et de Gestion des Eaux) to a more local scale. There are six *Comités de Bassin*, one for each French river basin, participated by the different water management stakeholders: representatives of local groups, of users, of the associations and of the State. *Comités* have 3 missions: elaboration of SDAGE and tracking its implementation; guiding the intervening policies of the Water Agencies, and giving their opinion about wider arrangements. As an example, the Comité de Bassin Rhône-Méditerranée-Corse has 124 members that are grouped in several colleges: territorial and local communities; competent persons and users; representatives from socio-professional sectors and State representatives.

The **Agences de l'eau** are public State organisms supervised by the Ministry of Town, Country Planning and Environment, and by the Ministry of Economy. Their aim is to impulse the rational use of water resources, to combat pollution and to protect the aquatic environment as far as river basins are concerned. There are 6 agencies in France operating in the six French great river basins. The one that is specifically in charge of the Mediterranean region is the *Agence de l'eau du bassin Rhône-Méditerranée-Corse*, which comprises the basins of Saone-Rhone, the coastal rivers of Languedoc-Roussillon, of Provence Alpes-Côte d'Azur and of Corsica and the Mediterranean coast.

The Water Agency receives payment from users depending on the amount of water used or the pollution generated, according to the principle that the polluter should pay. The main objective of these taxes is to foster that each individual makes a better use of water. These revenues allow the agency to finance studies, works and activities that help fighting the squander and pollution of water. The principle followed in this case is "the one who protects the environment (preserves, economises on the resource, combats pollution) will be helped".

The Agency operates in six areas: water sanitation; combating industrial pollution and toxic waste disposal; combating agricultural pollution; improvement of drinking water quality; management of surface and underground water resources; and recovery and preservation of the aquatic environment.

**BOX 7. TURKEY:****WATER SAVING AND DECENTRALISED IRRIGATION MANAGEMENT**

Turkey has the most favourable water situation of the region. Average annual precipitation is highest in the Black Sea region – 2 400 mm – and exceeds 800 mm in some Mediterranean coastal areas. In the remaining 70 % of the country, precipitation averages less than 500 mm, which is still enough for winter cultivation in some areas.

Transfer of irrigation systems to users started gradually in the early 1950s. Later, encouraged by the experience of Mexico and by World Bank financial support, in 1993 Turkey began an accelerated programme of transferring management of responsibilities for large irrigation systems. The main motives driving this transfer programme were concern about the ability of the Devlet Su Isleri (DSI), the state water works, to operate and maintain the large irrigation systems for which it was responsible and the heavy financial burden on the government. In 1993, it was estimated that there was an 83 percent shortfall between operation and maintenance (O&M) allocations to DSI and collected tariffs. In three years, DSI succeeded in transferring about 1 million ha to local government units or to irrigation associations and has now completed the transfer of the nearly 1.5 million ha it has developed.

Four provinces – Antalya, Adana, Konya and Izmir – were selected for the pilot programme of accelerated transfer, largely because officials and farmers in these provinces were more receptive. Transfer was supported with enhanced internal training, including seminars and workshops. Friendly rivalry among regions in promoting successful transfer contributed positively to the process. As a pilot case, the Antalya Regional Directorate of the DSI carried out a comparative study that showed that transfer of O&M services to WUAs had a significant and quantifiable positive impact on water savings and O&M, from both technical and financial points of view. Positive results included:

- An increased sense of responsibility;
- More reliable and equitable water supply;
- Improved irrigation efficiency with modern techniques such as drip irrigation, sprinkler and California systems: efficiency in water saving increased by 34% and in energy use by 31% in 5 years.
- A collection rate increase from 42 to 80 percent;

Source: CASE STUDIES ON WATER CONSERVATION IN THE MEDITERRANEAN REGION: IPTRID Secretariat, Food and Agriculture Organization of the United Nations. Rome, 2001

**BOX 8: TUNISIA:****INTEGRATED WATER MANAGEMENT IN A CONTEXT OF SCARCE WATER RESOURCES**

Tunisia has developed expertise in the fields of water resources mobilization and integrated management in a context of aridity, water scarcity and social and economic constraints. This expertise has been supported from the outset by a national strategy, strong political commitment and increasing user awareness.

In Tunisia the present water management strategy is the result of thirty years of water resources evaluation and mobilization and socio-economic development priorities for which water is essential. The present objectives of irrigation in Tunisia are to extend the irrigable surface by fostering adoption of water-saving techniques for irrigation – use of marginal waters and reuse of treated wastewater – and to implement corresponding measures for agricultural and irrigation system development. The recent review of the water sector emphasized the need to strengthen demand management in order to preserve and improve the use of declining and random water resources.

Prominent features of this expertise were the implementation of a regularly updated water database and decision support tools, the initiation of water saving programmes at network and field levels (following a government-sponsored survey of individual water consumption and subsidization of 40 % to 60 % of equipment; these programmes resulted in water savings of around 25 %), the use of pricing as a parameter of water-demand and water-saving management, and the protection of the environment through allocation of water to protected sites.

The new irrigation policy gradually shifts water-management responsibilities and costs to local authorities (WUAs). A comparable irrigation policy using surface water has been adopted in Turkey and other parts of the world. One of the special features of the Tunisian policy, however, is the creation of associations of underground-water users that will improve management of the water requirements of all irrigators using a shallow aquifer.

In Tunisia, irrigation differs from most regions in the world because water resources are almost entirely tapped and brackish water is used at salt concentrations of up to 46 gm/litre higher than standard irrigation practices. Tunisia has therefore acquired considerable experience in using low-quality water, which explains why the use of treated waste water is relatively developed in Tunisian irrigation programmes. With regard to equipments, however, the Tunisian water-saving programme has not focused sufficiently on software such as farmer training in optimum use of the equipment. Research shows that the introduction of drip irrigation does not save much water in Tunisia, although it increases yields. Use of brackish or salty water, for example, of which there is not much experience in the world, leads to the clogging of equipment.

The Tunisian development cannot be based solely on the mobilization of new water resources or on water transfers from the north to the drier south. Any integrated water management must now address water demand. Technical measures such as the introduction of new irrigation technologies or equipment are not sufficient. Financial measures such as pricing water at its real cost are necessary but politically more difficult to implement. Finally, the involvement of water users has been a key element of a successful integrated water-management strategy.

Tunisia has embarked on a new irrigation policy, which gradually shifts water-management responsibilities and costs to WUAs. One of the special features of the Tunisia policy, however, is the creation of associations of underground-water users that will improve management of the water requirements of all irrigators using a shallow aquifer. Experience will show whether such WUAs can manage aquifers in a sustainable manner.

The outputs of this measures have been 25 % of water saving and an increase of 33% in water-use efficiency.

Source: CASE STUDIES ON WATER CONSERVATION IN THE MEDITERRANEAN REGION, IPTRID Secretariat, Food and Agriculture Organization of the United Nations. Rome, 2001

#### **BOX 9: TUNISIA - Ichkeul National Park, A RESTORATION PLAN**

Ichkeul National Park (12,000 ha) harbours 3 major landscape units:

- A shallow lake with of 89 km<sup>2</sup> with seasonal variations in water depth and salinity, influenced by inflow of fresh water from the catchment in winter, and in summer by reverse flow of sea water via the Lake of Bizerta through the Tinja canal. The low salinity in winter promotes the development of aquatic plants that is the main food source of some 200,000 wintering migrant water birds.
- Temporarily flooded marshes of 30 km<sup>2</sup> with *Scirpus lacustris* and *S. maritimus*, the main food of Greylag Geese *Anser anser* and of the roughly 2,000 cattle belonging to people living in the Park. These plants require a period of flooding with water of low salinity for several months.
- A jebel (mountain), which constitutes an isolated outcrop on the southern shore of the lake and makes a major contribution to the natural beauty of the site.

Ichkeul is listed as Biosphere Reserve (1977); World Heritage Convention (1979); and Ramsar Convention (1980). The documents presented at the time of Ichkeul's inclusion in these lists noted that the construction of dams on the affluent rivers, as planned in the Master Plan for the Waters of Northern Tunisia, was likely to have an impact on the ecological character of the site.

During the 1980s, a research programme under the auspices of the Ministry of Agriculture evaluated the impact of the dams on Ichkeul. The Master Plan, in its original version, contemplated the building of six dams on rivers flowing into Ichkeul, the largest of which became operational in 1983, the following two dams in 1994. The Tunisian authorities, aware of the impact of these dams, organized an international seminar in 1990, which recommended a multidisciplinary study "Etude pour la Sauvegarde du Parc National d'Ichkeul", as a result of which numerous measures were adopted by the Tunisian authorities:

- the decision to cancel the construction of the other dams originally planned on three rivers.
- the classification of Ichkeul, in the planning of water resources by the General Department of Hydraulic Studies and Works in the Ministry of Agriculture, as a water consumer and the decision to grant Ichkeul an annual water quota.
- the decision to supply Ichkeul with water from the Sidi El Barrak dam (situated in a neighbouring catchment) once this dam becomes operational.
- the closure of the marble quarries on the mountain at Ichkeul.
- the decision to route the future Tunis-Bizerta motorway well away from Ichkeul.
- the measurements to monitor the status of Ichkeul carried out by ANPE since the end of the Study.
- the construction of waste water treatment plants at Mateur and Menzel Bourguiba.

#### **Current conservation status**

Despite all the conservation measures taken by the Tunisian authorities, the wetland have undergone a loss of biological diversity following the change of hydrological regimes. The fundamental question is whether it is possible to restore, at least in part, the previous richness. As forecast in the Study, the decrease in inflow of fresh water caused by the filling of the dams has led to salinization of the lake and marshes, changes in the flora, and to a decrease in numbers of water birds, especially of wintering birds. Recent drought has exacerbated this.

#### **Proposals on the long term management of Ichkeul**

An integrated management plan and an institution capable of implementing it, are planned. A water allocation of 20 million m<sup>3</sup> per annum has been made to assist with restoration of the lake, along with the construction of a sluice at the exit to the sea. The **Integrated management plan**, comprising a description of the site; definition of short-, medium- and long-term objectives, and the execution of measures to attain these objectives, following the guidelines of Ramsar Convention, in all cases encouraging the participation of local communities. The objectives of the plan intends to take account of the human users: fishermen and graziers, visitors and tourists.

**Institutional framework.** The implementation of the Plan foresees reinforcement of an appropriate management body, with the necessary powers of decision. The Park is currently managed by the General Department of Forests of the Ministry of Agriculture. Other departments of the Ministry of Agriculture have other responsibilities for matters: the General Department for Hydraulic Studies and Works for dams; the G.D. of Rural Engineering for the management of the immediately adjoining agricultural areas (there is no buffer zone); the G.D. of Fisheries and Aquaculture for fishery management and negotiations with the private fishery licence holder. The Ministry for the Environment and Land Planning plays an important role in co-ordination of the activities of other ministries (in particular in environmental impact studies), and represents Tunisia at many international events. The ANPE (which comes under the authority of the Ministry of the Environment) is responsible for the management of the Visitor Centre and for collecting data on the natural environment of the Park and plays a coordinating role for the development of the plan.

**B OX 10: Morocco : the Oued Broun river basin. A participative approach in integrated rural development in the province of Taza.**

The rural communes of Jbama and Beni Ftah are in the north of Morocco, in the pre-Rif mountains (Province of Taza), this project takes place in the Oued Broun sub-basin into M'Soun river basin. With a rough topography, this basin is 12.500 ha and includes 7.400 habitants. The water resources are scarce and with a very irregular rainfall pattern with common and long droughts and short episodes of torrential rains. These characteristics have negative consequences in the local economy and seriously increase the effects of soil erosion. The local economy is based almost exclusively in extensive raising of sheep and goats and some crops with traditional practices, and there is a high emigration, precarious employment, lack of infrastructures and basic social equipment. This situation feeds back poverty and further degradation of natural resources.

A river basin planning project with numerous partners was started with the particularity of proposing a [partnerial](#) approach among an ONG (ENDA Magreb), the central and regional administrations of the Secretary in charge of Waters and Forests (national direction of the project) and the United Nations Development Program (PNUD), with participation of other institutions as the Forest and Basin Planning Service, the National Research Centre, the Provincial Division of Agriculture; the Rural Communes; the Local Authorities; the Provincial Services for Public Works, for Health and for Education; and FAO. The objectives of the Project are:

- o Sustainable management of natural resources (anti-erosion and hydro-agricultural managements)
- o Improvement of basic infrastructure (water drinking installation, rehabilitation of racetrack, ...)
- o Education
- o Support of revenues generating initiatives (mainly with women, young and small farmers)
- o Capacity building of local actors of development

This project has developed into a permanent process of agreement and integrated development. The main constraints and difficulties of this strong participative approach were:

- The inequality in terms of revenues and of access to land property;
- The local organisations -the traditional jemaâ - are not operative and their conciliatory role is weak;
- Women's weak integration;
- Difficulties to mobilize the institutional actors and lack of familiarity in participative methodologies.

Field practitioners express that sustainable management in this basin can not be effective without results in production and revenues and an increased allowance and capacity for decision making at the local level. Although the first objective of the project was the restoration and preservation of a degraded territory, one of the strongest lessons of this pilot experience has confirmed the need for articulations among answers to the environmental degradation and the necessities expressed by the local actors.

Source : Enda Maghreb .