



Water for the 21st Century: Vision to Action

Framework for Action
The North Mediterranean Sub-Region



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The Framework for Action – Mediterranean Islands is part of the Framework for Action for the Mediterranean: Achieving the Vision for the Mediterranean (FFA), elaborated within the MEDTAC (now GWP-Med) preparation for the 2nd World Water Forum, The Hague, 2000.

The FFA aims to offer a framework action programme for achieving the "sustainable" scenario described in the Mediterranean Vision on Water, Population and the Environment (Vision). Within the elaboration of the FFA, three sub-regional FFA were prepared on: North of the Mediterranean, Middle East Mediterranean Islands and North Africa.

The elaboration of the FFA was coordinated by the Mediterranean Water Network (MWN) with contributions from a group of experts.



Global Water Partnership

Water for the 21st Century: Vision to Action

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About GWP and GWP-Med

The Global Water Partnership (GWP) was established in 1996 to support countries in the sustainable management of their water resources. GWP is an independent network open to national governments, research and non-profit organizations, NGOs, UN agencies, multilateral banks, private companies, and other institutional stakeholders involved in water resources management. GWP facilitates the exchange of knowledge, experience and the practice of Integrated Water Resources Management (IWRM). The partnership has a decentralized, self-reliant character through its presently active nine Regional Water Partnership and twenty Country Water Partnerships. The GWP Associated Programs (APs) provide services on the ground to assist solving problems encountered by stakeholders in water resources management. In this manner these operational, autonomous programs support countries and regions to implement actions towards IWRM.

For more information visit: <http://www.gwpforum.org/>

The Global Water Partnership - Mediterranean (GWP-Med) is a Regional Water Partnership under the global GWP umbrella. The GWP-Med core Partners (2001) are seven Mediterranean organizations / institutions with regional coverage and activity: Blue Plan (MAP/UNEP), CEDARE, CIHEAM, IME, MedWet, MIO-ECSDE, and MWN.

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

To achieve its goal, GWP-Med:

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

The main GWP-Med products (1999-2000) have been:

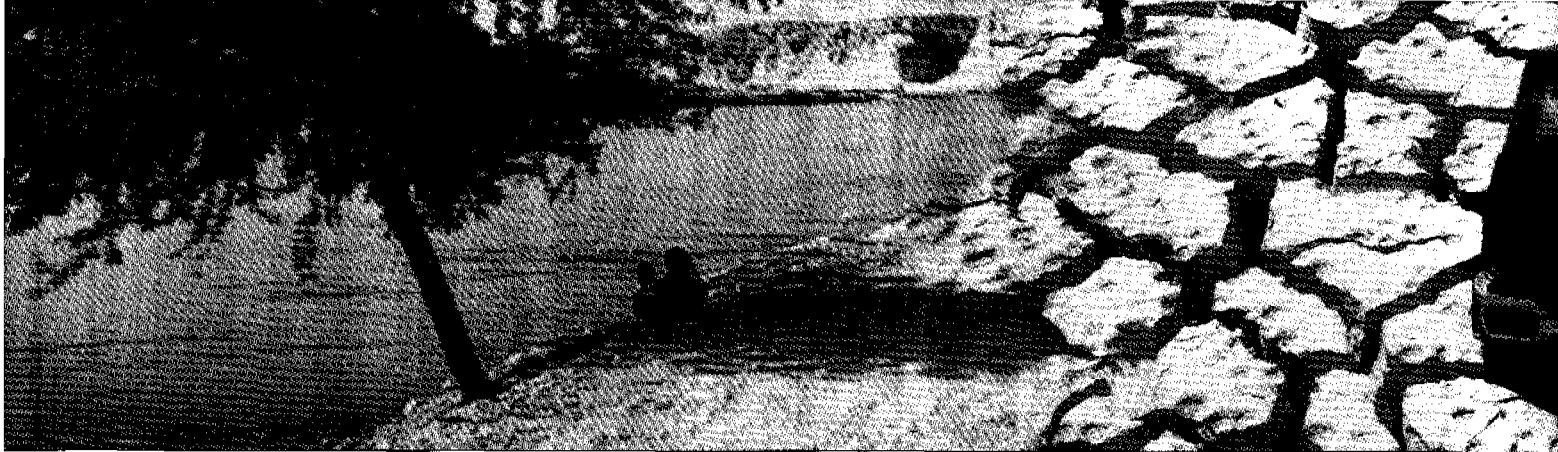
- Mediterranean Vision on Water, Population and the Environment (Vision), prepared by Blue Plan (MAP/UNEP).
- Framework for Action for the Mediterranean: Achieving the Vision for the Mediterranean (FFA), prepared by the Mediterranean Water Network (MWN) with contribution from a group of experts.
- Mapping, prepared by the International Program for Technology and Research in Irrigation and Drainage (IPTRID/FAO).
- Core for Action Plan, prepared by the Mediterranean Information Office for Environment, Culture and Sustainable Development (MIO-ECSDE) with contributions from a group of experts.

At present GWP-Med, while solidifying and expanding the regional partnership, is working to achieve its main goals through a detailed Work Program for 2001, and 2002-2004.



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1. Characteristics of the Sub-Region

1.1 General characteristics

The North of the Mediterranean is a distinctive sub-region in the wider regional context. However, the sub-region has a number of internal physical, environmental, political and socio-economic differences. There are 10 countries in the sub-region, from Spain in the west to Turkey in the east. This analysis doesn't take in consideration the islands of Spain, France, Italy, Croatia, Greece and Turkey.

The sub-region has the total area of 2,5 mil. sq. km where, in 1997, more than 250 million people lived. The area is densely populated and the resident population, consequently, is making constant pressure upon its water resources. The average population density is 102 inh/sq. km, ranging from 79 in Bosnia and Herzegovina to 195 in Italy. It must be noted that not all of the above population is living in the Mediterranean watersheds of the sub-region, but these watersheds are occupying large parts of the countries' territories.

It is the specific situation in water sector, which makes this sub-region so different from other sub-regions in the Mediterranean (North Africa, Middle East, islands). Major Mediterranean watersheds (save the river Nile) are located in this sub-region (Ebro, Rhone, Po, Neretva). Average annual rainfall ranges from 500 to more than 1000 mm/year, with only Spain being an exception having, generally, less than 500 mm/year. In coastal areas precipitation is not equally divided between seasons, with most of the rain falling in winter, while in summer many areas (due to increased demand) are experiencing water shortages and droughts (averaging, for example, three to seven months along the eastern Spanish coast). Evapotranspiration along the Northern Mediterranean coast is between 400 and 600 mm/yr. Mean annual runoff varies considerably, from 100 mm/yr. along the Spanish coast to 400-500 mm/yr. along the coasts of the Ligurian Sea, and 300 mm/yr. along the Adriatic coast. It could be concluded, though, that the sub-region is abundant with groundwater and surface water resources, that resources that are being regularly recharged, in most parts of the sub-region, by a steady rainfall. Therefore, the lack of water is not a predominant characteristic of the sub-region (see Tables 1 and 2).

The sub-region, as a whole as well as in its parts, could not be treated as a unitary area. There is a number of dichotomies. With regard to availability of water, the first dichotomy is one between the coastal and hinterland areas of the sub-region. The second one is between developed and developing parts of the region. And the third important dichotomy is political one, i.e. between EU countries and those who are aspiring to join it. All above-mentioned differences are very pronounced, and have and have significant impacts upon use of water in the sub-region.

1.2 Contexts for the analysis of water sector in the sub-region

Water sector in the North Mediterranean sub-region is operating within a number of different contexts. Context could be defined as a group of common issues requiring a concerted effort to be solved. They constitute basis for the analysis of water sector and create the basis for future strategies and actions. The contexts are discussed in the following sections.

1.2.1 Natural context

Most of the sub-regional areas could not be considered as dry climatic zones, except in some parts of southern Spain, Italy, and some coastal areas of Turkey and Greece. Countries have sizeable water resources and, having more than 1,000 m³/inh/year (Table 1), no country is experiencing water stress.

Rainwater conditions are generally favourable, with numerous and abundant watercourses, and significant surface and ground water resources. Droughts are only

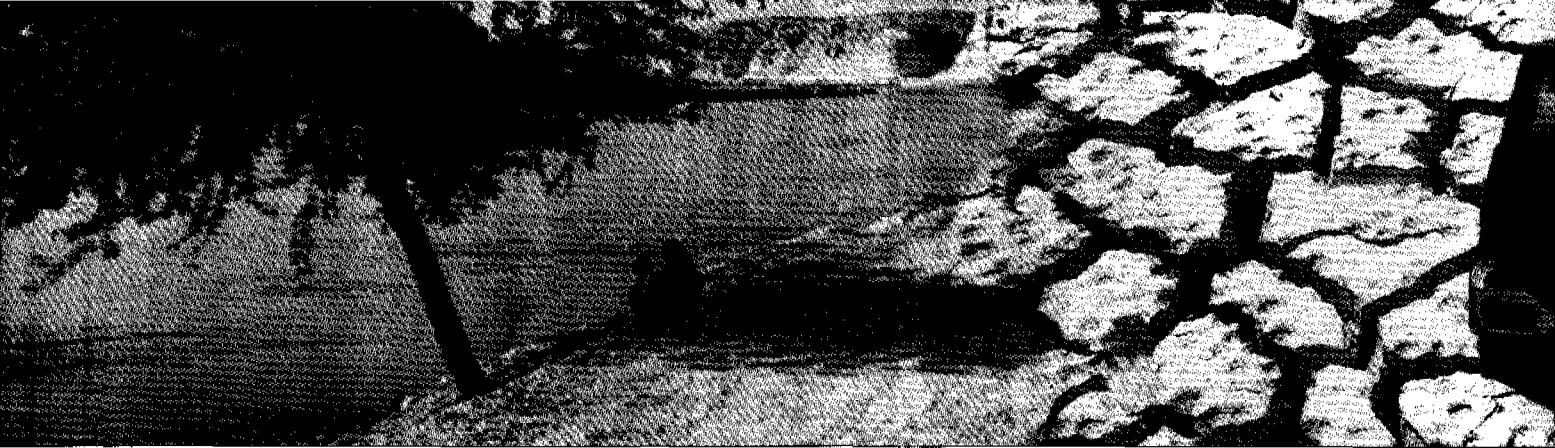


Table 1.
Freshwater resources
and distribution.

	Freshwater resources			
	m ³ /inh 1997	% used for agriculture	% used for industry	% used for industry
Albania	16,785	76	18	6
Bosnia & Herz.	/	/	/	/
Croatia	12,789	/	/	/
France	3,029	15	69	16
Greece	5,289	63	29	8
Italy	2,903	59	27	14
Slovenia	/	/	/	/
Spain	2,398	62	26	12
Turkey	2,246	72	11	16

Adapted from: The World Bank, 1999. The World Development Indicators. Washington, DC: The World Bank.

occasional, and are not a predominant natural characteristic of the sub-region. The sub-regional problem is seasonal variations and resulting insufficiencies in water supply, particularly, particularly in many of its coastal areas. This fact is linked as much to the changing climatic conditions as to sudden increase of users, mainly tourists, visiting, visiting coastal areas in summer. The karstic areas in the Balkans are specific natural phenomenon where, in spite of the abundant rainwater and watercourses, water supply is unpredictable.

1.2.2 Level of exploitation of water resources

The mix of sectoral uses of water could be judged as being, generally, positive (Table 1). The use of water for agriculture (irrigation) in all countries is lower than 80% of the total water used (the highest share being in Turkey – 76%). Developed countries of the sub-region (Spain, Italy, and Greece) except France, also use plenty of water for agriculture. Agricultural sector in these countries is developed but also subsidised. Agriculture is mainly irrigated while the cost of water is being kept, for a variety of socio-economic reasons, artificially low. Large part of water is used for hydro-energy production, but this water is generally being reversibly used.

Current pressures on water resources are shown in Table 2. These pressures are manageable because they are far lower than levels in other Mediterranean sub-regions. Exploitation index is generally below 20%, which is quite positive and shows that there is an abundance of water and indicates wide margin for its future use.

Table 2.
Current pressures on water
resources in Mediterranean
Countries.

Countries	Date of value	Indexes of quantitative pressure on natural resources %		
		Index of potential depletion %	Exploitation index	Final consumption index
Spain	1997	31,4	20,6	3,6
France	1994	22,5	4,9	3,1
Italy	1993	26,7	14,5	5,4
Slovenia	1990	6,5	~1	2,3
Croatia	1990	6,5	~1	2,3
Bosnia & Herzegovina	1990	6,5	~1	2,3
FR Yugoslavia	1990	6,5	~1	2,3
Albania	1995	3,3	2,1	0,7
Greece	1990	10,2	8,6	~0,2
Turkey	1997	18,1	12,6	3,2

Adapted from: The Blue Plan, 1999. Mediterranean Vision on Water, Population and the Environment for the 21st Century. Sophia Antipolis: The Blue Plan



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

In some countries, decrease in water consumption could be attributed to the implementation of conservation measures. Thus, current losses in water networks of the sub-region range from 10 to 70%. However, there where privatised companies are managing water distribution, the losses are lower. Water pollution is still a major problem, seriously affecting many coastal ecosystems. Countries' priorities are being shifted towards investments in improving sewage treatment.

1.2.3 Financial system

In all countries, financing water infrastructure requires sizeable resources. Solutions differ among countries, but governments are always an important investor. In countries where water management is privatised or it will soon be so, government financing is diminishing, and private companies are taking ever-larger share of it. Financing system is closely linked to the tariffing system. In countries with more privatised water industry, tariffs are approaching the real cost of water development and distribution. In some countries there is no lack of financial resources for water infrastructure, in particular for urban water services. Also, private companies are very much interested in reducing the amount of non-accounted for water, because that is where a large chunk of their profits lie.

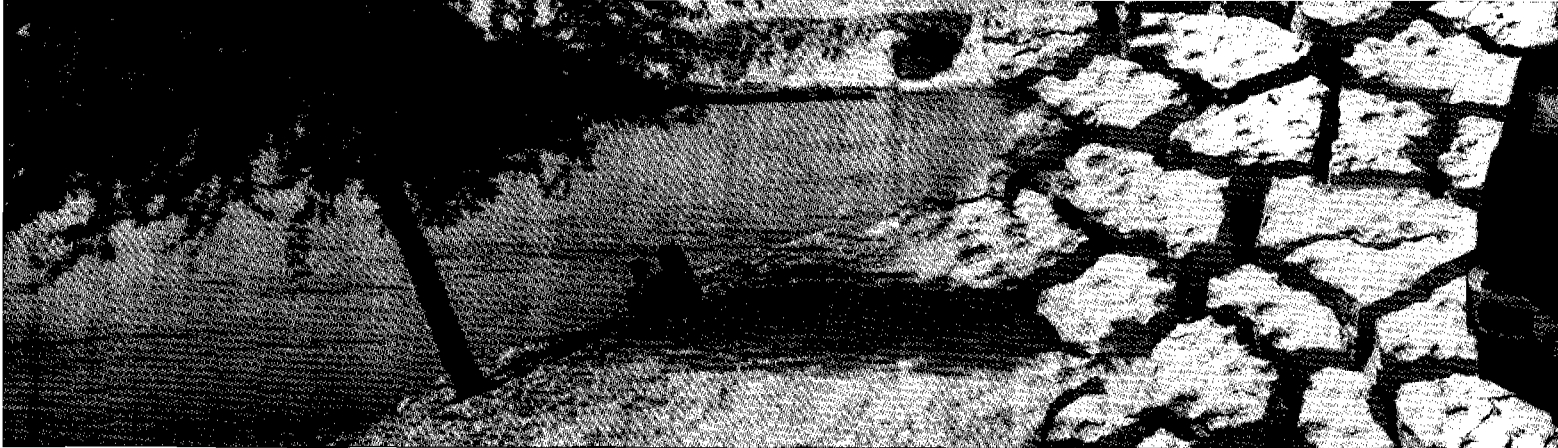
Countries of the Balkans, save Greece, are having large problems with financing investments in water sector. It still, to a large extent, depends on the external financial support. However, in most of the countries, water for agriculture is being provided at a price that is far below actual cost of its development, production and distribution. On top of that, the cost of building irrigation infrastructure is largely being borne by the governments.

There is an increasing trend towards investments in improving water quality, particularly through construction of sewage treatment plants in coastal (tourist) areas (France, Spain, Italy, and Greece). EU regulations and directives are greatly encouraging this trend.

1.2.4 The institutional context

The fact that in most countries water is being considered as a specific cultural issue strongly affects effectiveness of water management. This is particularly present in the agricultural sector. There is almost no country where full cost of the provision of water for irrigation is being fully paid by farmers. The difference is being paid by the State. Everyone considers water as a public good, and it is considered that everybody should have access to it, but at a fraction of the cost of its production and distribution. This is negatively affecting the conservation efforts.

Water management, institutionally, is organised at two distinctive levels. At the first, higher level, the institutions that care for water development and production are, in most



Contexts for the analysis of water sector

- Natural
- Level of exploitation of water resources
- Financial system
- Institutional
- Socio-economic development
- Technical systems
- Management practices

countries, organised at the river basin level. These organisations are largely owned and managed by the State. At the second, lower, level water distribution is being delegated to municipal to municipal authorities. Increasingly, the responsibility at this level is being handed over to private to private companies. This system has resulted in significant water savings and improvements in water supply. However, the accompanying effect has been the increase in the price of water.

In some agricultural areas, water users associations are managing distribution of water (Spain, France, Greece, and Turkey). This is a growing trend that brings an improvement in efficiency of water use. However, major part of the cost of development and production of water for irrigation is still being borne by the State. And finally, in all countries, except in Albania and Bosnia and Herzegovina, legislation on water has been improved and, more or less, brought in line with the principles of sustainable water management. There are problems, however, with the enforcement of that legislation.

1.2.5 The context of socio-economic development

The biggest dichotomy in the sub-region is related to the level of economic development. Countries of the European Union are the richest countries of the Mediterranean region, while Bosnia and Herzegovina and Albania have the lowest GDP per capita (see Table 8). This fact also reflects the state of water infrastructure. Losses of water are highest in the latter two countries (close to 70%).

With regard to water, two economic activities should be singled out in all countries: agriculture and tourism. Agriculture consumes most of the water but is not the largest contributor to the GDP, and not always the largest exporting economic sector. This shows that water in agriculture has not been efficiently used. There are political reasons why this is so. In some countries, cost of water is kept artificially low (Greece), or the government heavily invests in rural areas (Turkey), in order to curb migration flows from rural towards large urban areas.

Tourism is increasingly becoming the most important economic sector in many countries. In some, it has been already major economic activity (Spain, France, Italy, Greece), while all other countries are placing great hopes in this sector to become a major driving force towards their future prosperity (Albania, Croatia, Turkey). Since tourism is mainly concentrated in coastal areas, that are already suffering from occasional water shortages, areas that are already suffering from occasional water shortages this new trend is additionally increasing water demand, and aggravating the problem of shortages.

Urbanisation is another phenomenon contributing to the increase of water demand in almost all countries. In developing countries, employment opportunities are highest in urban areas, pulling labour force from the rural areas (see Table 7). Since many large urban agglomerations are located in coastal areas, their growth increases water demand bringing additional water shortages.

1.2.6 Technical systems

Coverage of the population by safe drinking water is generally good. In urban areas of the developed countries it is almost 100%. In developing countries it ranges between 76 to 97%. But in Albania, in spite of large coverage, water is being supplied only for a few hours a day because of extremely poor maintenance of the water network that results in high water losses and frequent breaks in the functioning of the network.

The coverage of population with sanitation services is generally lower. The differences between developed and developing countries, or between urban and rural areas are larger than is the case with drinking water. Table 3 shows the extent of both coverages.



Year	Access to Safe Drinking Water (percentage of population)						Access to Sanitation Services (percentage of population)					
	Total		Urban		Rural		Total		Urban		Rural	
80	90	80	90	80	90	80	90	80	90	80	90	
Turkey	76	/	95	/	62	/	92	/	56	/	90	/
Albania	97	/	100	/	95	/	100	/	100	/	100	/
France	/	100	/	100	/	100	/	100	/	100	/	/
Greece	98	/	93	/	100	/	98	/	83	/	80	/
Italy	100	/	100	/	100	/	100	/	100	/	100	/
Monaco	/	/	100	/	100	/	/	/	/	/	/	/
Spain	/	98	100	100	68	81	/	72	81	73	79	69
FRYugosl.	/	83	/	100	/	65	/	63	/	78	46	/

Table 3.
Mediterranean Islands area,
population and population density
data.

Adapted from: Habitat, 1996. An Urbanising World:
Global Report on Human Settlements. Nairobi:
Habitat.

Technical systems for sewage treatment in poorer countries are not in a satisfactory condition. In EU countries, water companies, usually responsible both for water supply and sanitation, are mainly privatised and they are shifting their investment priorities towards improvement of the water quality. They are also forced to do so by the EU regulations. Table 4 shows the situation in EU countries.

The crucial issue in this context is the question of water losses because it greatly increases water demand. In some countries, water network is in a very poor state, and losses range from 20 to 70%.

Also, indiscriminate use of water is still keeping its consumption at a more than acceptable level. The typical situation is when the highest quality water is being used for the purposes which do not need such quality of water, such as the water for cleaning the streets, or for maintaining parks and gardens. Such water is much more expensive to produce than the lower quality water, but it will have to be supplied from non-conventional sources and via separate networks. That might increase the costs in a short term.

1.2.7 Management practices

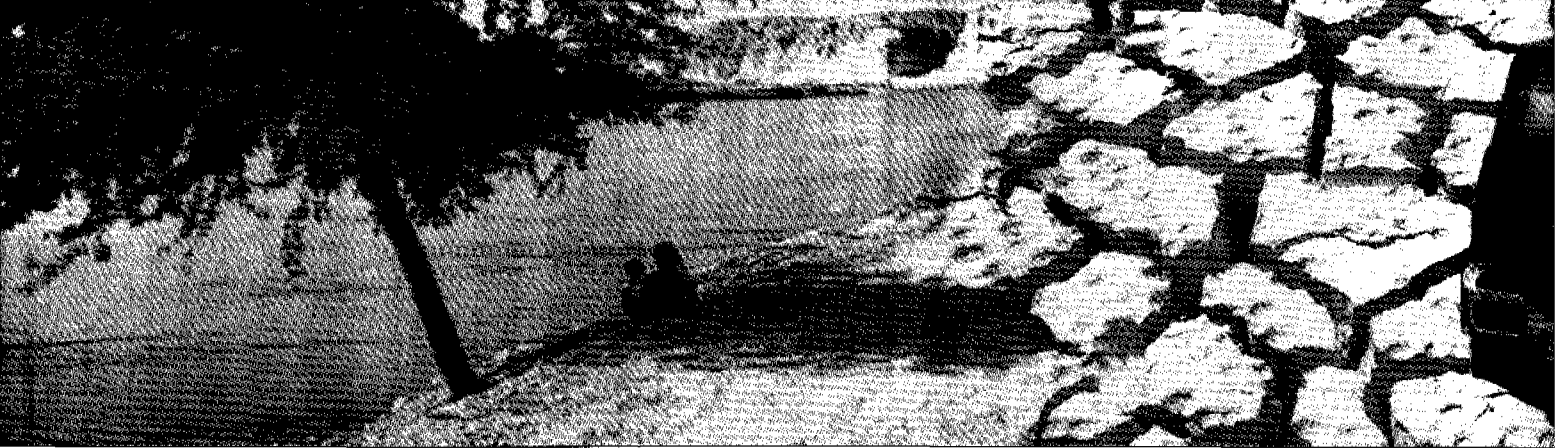
The basic issue is who is in control of water, i.e. who is responsible for issuing water rights, particularly in agricultural areas. Since water is considered as a common, or public good in majority of the countries, the responsibility for its management lies within a relatively high authority. It is usually the Ministry of Development, Ministry of Public Works, Ministry of Agriculture, or some special agency set up for that purpose by the Government. Management of water is, then, usually delegated to regional or municipal companies. In some countries there is also a lack of qualified personnel (Albania, Bosnia and Herzegovina).

Planning for water resources management is either highly centralised, as in France where it is executed through water basin authorities and implemented through

Year	Wastewater Treatment (Percentage of Population Served)											
	Primary Treatment			Secondary Treatment			Tertiary Treatment			All Treatments		
80	85	90	80	85	90	80	85	90	80	85	90	
France	x	x	x	x	x	x	x	x	61,5	64,0	68,3	
Greece	0,0	0,7	x	0,5	9,3	x	x	x	0,5	10,0	x	
Italy	x	x	x	x	x	x	x	x	30,0	x	60,7	
Spain	8,8	13,2	11,0	9,1	15,8	38,0	x	x	4,0	17,9	29,0	53,0

Table 4.
Wastewater treatment in EU
Countries 1980-90.

Source: World Resources Institute, 1995. World Resources
1994-95: A Guide to the Global Environment. People and the
Environment. Washington, D.C.: WRI.



comprehensive river basin plans – SDAGE which also include management of coastal areas and with large financial resources are involved, or is delegated to the provinces as is the case in Italy (each river basin, for which there is a water authority, consists of several provinces; river basin authority is only checking the balance of supply and demand of water, but is not making plans for the future use). In some countries, there is also lack of co-ordination among responsible agencies, as well as great fragmentation between all those responsible for water management.

In spite of positive rhetorical large aspirations in the countries visited of the subregion, the application of Integrated Water Resources Management (IWRM) and water demand management is still far from being widespread in the sub-region. SDAGE in France is a case in point. Although it relatively successfully integrates river basins and coastal areas, however, it is still more a sectoral water management plan than an integrated sustainable water development plan, that integrates brings together other socio-economic and other issues with the water management aspects. However, it is a valuable step forward towards effective water management because it still sets up proposals that a very rigorous management system be set up. The implementation of SDAGE shows some positive results, albeit at a large cost.

In Spain, regional water master plans are not being adopted yet, although already prepared. Thus, for example, the Catalunya Water Master Plan (from 1992) uncovers large negative imbalances in the between future water demand and use, but supply. However, it leaves open the solution to the question dilemma whether how to develop additional water resources: within the region internally (, by development of developing new resources or through conservation), or to bring water from outside of the region by transferring the water to Catalunya from Rhone River in France. The solution to this dilemma question is now left to the politicians. In Italy, river basin authorities have relatively restrictive role in water planning. They are allowed to check the balance of water use balances, but not to prepare their own plans. In Croatia, State Directorate for Water it is preparing only the middle term water strategy that is being prepared at best, and but this strategy is highly sectoral.

1.3 Identification of country specific issues

Based on the natural and socio-economic criteria, three distinctive groups of countries could be identified in the Northern Mediterranean sub-region:

a) The water plenty and economically developed North:

- Northern Spain,
- France,
- Central and Northern Italy, and
- Internal Part of Greece.

b) The water plenty and economically less developed North:

- Slovenia,
- Croatia,
- Bosnia and Herzegovina,
- FR Yugoslavia,
- Albania, and
- Turkey.

c) The water scarce and economically developed North:

- East Coast of Spain,
- Southern Italy, and
- Coastal Area of Greece.



The following table (Table 5) shows the cross-sectoral analysis between above defined groups of countries and different contexts which contexts, which have been identified in section 1.2. The analysis uncovers the country specific issues in water management in all countries of the sub-region.

The subregional territorial subdivision presented above and the analysis of contexts within which the water sector operates shows that water management problems significantly differ among particular groups of countries. In the developed North, implementation of market mechanisms, together with the overall healthy economic situation and abundance of water, has brought an improvement of the situation in water sector. This was largely helped by the overall healthy economic situation and abundance of water. On the other side of the spectre, the water abundant but economically less developed North, still suffers from basic problems in water supply, because of the poor state of the water distribution network, that is mainly due to the result of poor maintenance, slow materialisation of investment opportunities and, generally, much lower efficiency of water use. That results in occasional local water crises and reduced availability of water, particularly in their coastal areas, are frequent phenomenon in spite of good water availability (the most acute case of is Albania).

If no action is will being taken, then the countries of the sub-region could be confronted with the following risks in the near future:

(a) The water plenty and economically developed North:

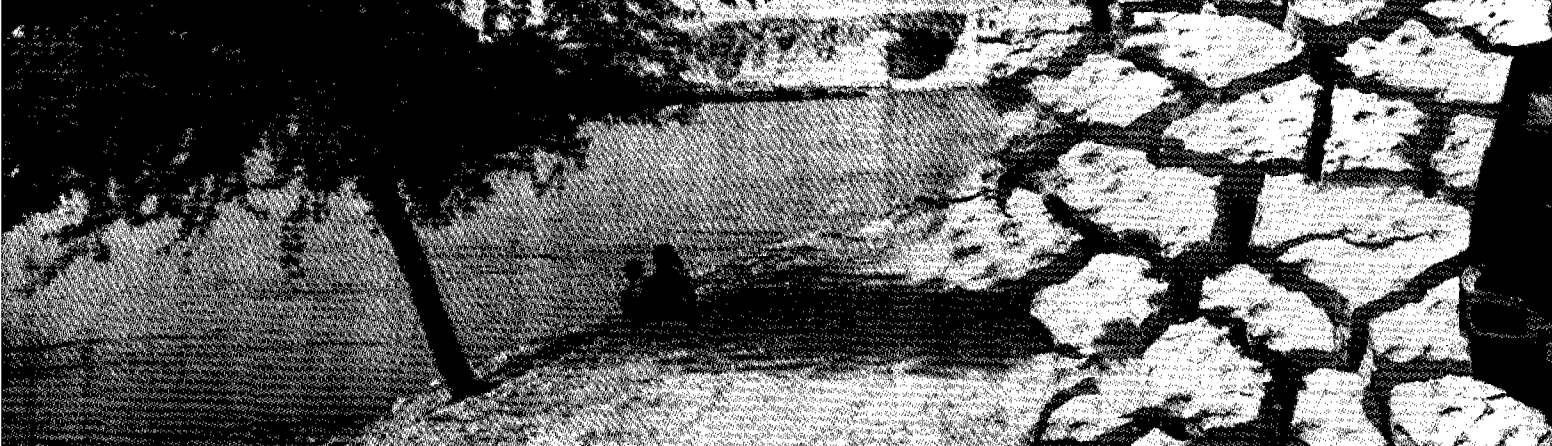
- Increasing pressures on the coast as a result of tourism development will bring seasonal water supply problems in the regions which regions, which are already confronted with lower availability of water.
- Increasing pressures on urban areas will cause rising demand, not in per capita consumption, but as a total increase of demand because of absolute urban population growth. Also, the indiscriminate use of water for urban purposes could bring water shortages and require costly technical solutions to secure stable water supply.
- Increased pollution in urban areas, as well as in areas affected by the agricultural pollution could bring deterioration of coastal water quality.
- Continuation of subsidies to agriculture and non-economical use of water for irrigation will prolong its inefficient use.

(b) The water plenty and economically less developed North:

- Poor state of water infrastructure could increase the frequency of water crises.
- Poor state, or non-existence, of sewage treatment facilities could bring the increased pollution of coastal waters.
- Increased migrations to urban areas will increase demand for water. Technical systems will not be able to cope. Sprawl of haphazard urbanisation in drainage basins will increase the risk of aquifer pollution.
- Indiscriminate tourism growth will increase the vulnerability to the risks of seasonality of supply.
- Low water tariffs will reduce the capacity to invest in the improvement of water infrastructure resulting in more frequent cuts in water supply.
- Lack of enforcement of laws and regulations will increase the risk of conflicts over water use.

(c) The water scarce and economically developed North:

- Pressures in coastal areas could will increase if tourism growth continues. If adequate quantities of water is will not be supplied this could bring occasional water shortages due to high seasonality of demand could be expected.
- High demand for water in agriculture persists. If crops are will not be changed this could bring occasional water crises would occur.
- If improvement in water infrastructure will not be made, water losses could remain high in some areas.



Context	Water plenty and economically developed North	Water plenty and economically less developed North	Water scarce and economically developed North
1. Natural context	<ul style="list-style-type: none"> Water abundant Occasional draughts in coastal areas Occasional problems with water quality No water stress 	<ul style="list-style-type: none"> Water abundant Occasional draughts in coastal areas Karst: problems with continuity of supply Problems with seasonal variations No water stress Water pollution problems 	<ul style="list-style-type: none"> Scarcity of water Frequent draughts Water stress
2. Level of exploitation of water resources	<ul style="list-style-type: none"> Reduced use of water for irrigation (except Italy) Decrease in urban water consumption Hydroenergy production Exploitation index low Reduced water losses Tourism seasonality 	<ul style="list-style-type: none"> Reduced use of water for irrigation (except Turkey) Overall decrease in water demand Migrations: increase of urban water demand Hydro-energy production Exploitation index low Water losses high Tourism seasonality 	<ul style="list-style-type: none"> Depletion of resources due to scarcity of supply Water losses high Irrigation share very high Decrease in urban water consumption Tourism seasonality
3. Financial system	<ul style="list-style-type: none"> Abundant resources for investment Government subsidises irrigation Water tariffs in urban areas realistic Shift of investment priorities to sewage treatment Water distribution in urban areas privatised companies generate investments Trans-boundary water transfer planned 	<ul style="list-style-type: none"> Investment resources scarce Reliance on outside help Water tariffs less realistic Privatisation practically non-existent Irrigation subsidised 	<ul style="list-style-type: none"> Abundant resources for investment: EU backed Irrigation subsidised Water tariffs in urban areas realistic Investments in the improvement of water quality, particularly in coastal tourist areas Water municipal distribution privatised
4. Institutional context	<ul style="list-style-type: none"> Government provides water, distribution privatised Water users associations (WUA) in rural areas EU water legislation River basin management 	<ul style="list-style-type: none"> Water is cultural issue Water legislation exists, problem with enforcement Government provides water, municipalities distribute, no privatisation (only in Turkey, limited) WUA in Turkey 	<ul style="list-style-type: none"> Government provides water, distribution privatised Water users associations (WUA) in rural areas EU water legislation River basin management
5. Socio-economic development	<ul style="list-style-type: none"> The richest countries of the region Easy employment shifts between economic sectors Tourism and agriculture major sectors in coastal areas Very slow, sometimes negative, population growth 	<ul style="list-style-type: none"> Economically at the low end in the region Transition economies Economic sectors rigid Low alternative employment opportunities Tourism great hope for economic development Urban areas pull labour force, increased water demand Mostly very low, but also very high population growth 	<ul style="list-style-type: none"> Middle income countries or areas EU subsidies Tourism is great employment opportunity, contributes to the seasonality of demand Agriculture rigid: if crops change export markets lost (Spain) Low population growth
6. Technical system	<ul style="list-style-type: none"> Improved, low water losses Almost full access to drinking water High coverage with sewage treatment plants: influence of EU regulations Good maintenance 	<ul style="list-style-type: none"> Poor state of systems High water losses Investments (external) concentrat on improvement of existing water systems Indiscriminate use of water 	<ul style="list-style-type: none"> Systems improved, but water losses still high somewhere EU investments in water infrastructure: dams, sewage treatment High coverage for drinking water, much less so for sewage
7. Management practices	<ul style="list-style-type: none"> Government issues water rights, companies distribute Planning for water management 	<ul style="list-style-type: none"> Government has central role in issuing water rights Planning exists Many actors, lack of coordination Lack of qualified personnel 	<ul style="list-style-type: none"> Governments issues water rights Planning for water management

Table 5. Cross-sectoral analysis between contexts and countries-identification of country issues.

2. Major Drivers for water in the Northern Mediterranean Sub-Region

	Estimates and Projections ('000)					An. Growth Rate (%)			
	1975	1990	2000	2010	2025	75-90	90-00	00-10	10-25
Turkey	40025	56098	67748	77883	90937	2,25	1,89	1,39	1,03
Albania	2424	3289	3624	4060	4668	2,03	0,97	1,14	0,93
Bos. & Herz.	3747	4308	4330	4420	4474	0,93	0,05	0,21	0,08
Croatia	4263	4517	4433	4373	4234	0,39	-0,19	-0,14	-0,22
France	52699	56718	59024	60130	61247	0,49	0,40	0,19	0,12
Greece	9047	10238	10573	10458	9868	0,82	0,32	-0,11	-0,39
Italy	55441	57023	57254	55985	52324	0,19	0,04	-0,22	-0,45
Monaco	25	30	34	37	43	1,22	1,25	0,85	1,00
Slovenia	1742	1918	1945	1918	1825	0,64	0,14	-0,14	-0,33
Spain	35596	39272	39848	39514	37571	0,66	0,15	-0,08	-0,34
FR Yugoslavia	9085	10156	10696	11085	11478	0,74	0,52	0,36	0,23
Total	214094	243567	259508	269863	278669				

Table 6.
Size and growth of population in the North of Mediterranean.

Adapted from: Habitat, 1996. An Urbanising World: Global Report on Human Settlements. Nairobi: Habitat.

The drivers are (forces in the wider socio-economic and physical environment that induce changes in the water sector). Described below the situation with water in the Northern Mediterranean sub-region today. These drivers will be assessed and the analysis will serve as the basis for designing future strategies and actions towards sustainable water management in the sub-region.

2.1 Demographic changes

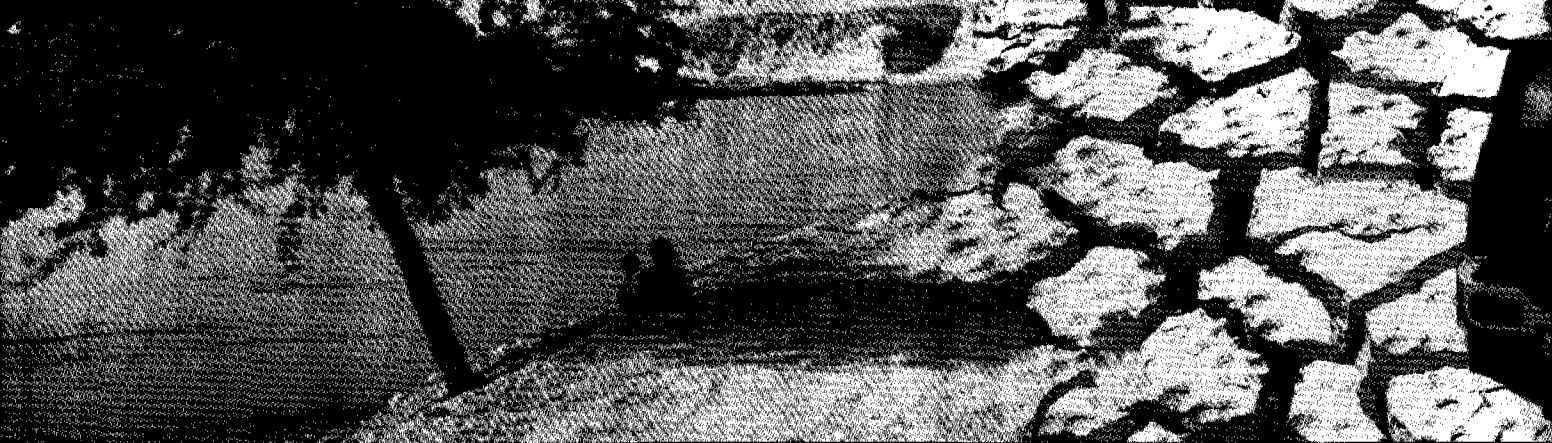
Sub-regional countries have more than half of the Mediterranean population today. The sub-region as a whole will exhibit only modest population growth in the future (except Turkey and Albania), but its share of the total population in the region will still remain high in the future (Table 6).

However, it is not the total number of the population, which grows concern in this sub-region. It has, on average, plentiful water resources and major water crises are not expected in the future. The situation, thus, is much better than in other Mediterranean sub-regions. But there are some demographic parameters that indicate more disturbing developments in selected areas of the subregion. These negative drivers in this respect are the growth of urban population and the growth of coastal population (Table 7). A number of urban agglomerations in the North experience water crises, particularly those in the coastal areas. There, water demand is high and water cannot be satisfactorily

	Level of Urbanisation (% of total population in urban settlement)			Urban Population (thousands)			Annual Urban Pop. Growth Rate (%)		Coastal Urban Pop. ('000)	
	1975	2000	2025	1975	2000	2025	75-00	00-25	1980	2000
Turkey	41,60	74,84	86,99	16651	50701	79102	4,45	1,78	9928	17028
Albania	32,77	39,54	56,99	794	1433	2661	2,36	2,48	622	1140
Bosnia & Herzegov.	31,29	53,18	69,34	1172	2303	3102	2,70	1,19	/	/
Croatia	45,13	68,52	80,97	1924	3037	3428	1,83	0,48	/	/
France	73,02	73,45	81,73	38481	43355	50055	0,48	0,57	9380	10692
Greece	55,31	67,82	79,10	5003	7171	7806	1,44	0,34	5252	6559
Italy	65,64	67,11	76,25	36394	38422	39895	0,22	0,15	21232	23721
Monaco	100,0	100,0	100,0	25	34	43	1,23	0,94	/	/
Slovenia	42,38	67,39	79,21	738	1311	1445	2,30	0,39	/	/
Spain	69,57	77,71	84,87	24765	30964	31886	0,89	0,12	13903	17925
FR Yugoslavia	42,98	59,90	73,88	3905	6407	8479	1,98	1,12	/	/

Table 7.
Urbanisation trends 1975-2025.

Adapted from: Habitat, 1996. An Urbanising World: Global Report on Human Settlements. Nairobi: Habitat.



supplied from nearby sources. In order to avoid water shortages some cities are proposing costly solutions by planning to bring water from the far away places (Istanbul is planning to bring water from two sources 50 and 200 km away respectively, while Barcelona is planning to bring water from the river Rhone). However, this option is not available to many urban agglomerations in the North.

The temporary (seasonal) growth of population because of tourism activity is a growing concern in the sub-region. As a consequence, many coastal tourist areas are confronted with water crises in the summer. Additionally, deterioration of the water quality is frequently occurring in coastal areas, particularly in tourist settlements. This fact places an additional burden upon their investment priorities. Although this situation occurs only during the short periods of time (in the peak of tourist season), tourist settlements have to base their plans on the maximum water demand. In some countries, this is not easy because of reduced investment possibilities, which then results in having the water supply disrupted and water pollution increased. Unfortunately, very little is being done in increasing the water conservation particularly, and the public awareness campaigns to improve water conservation are rare.

2.2 Political changes

The political changes are becoming ever more significant factor for achieving more effective water resources management. Countries of the sub-region belong to different political associations. Some are members of the European Union (Spain, France, Italy, and Greece) that forces them to follow, sometimes, very stringent common regulations and directives in the water sector. Slovenia, and to a lesser extent Turkey, are prospective member of the EU, that are expecting to join it in the next few years. They are also adopting and following EU rules and regulations as part of the "acquis communautaire" process. And, finally, some countries are a little bit further from joining EU (Croatia, Bosnia and Herzegovina, FR Yugoslavia, Albania), but being aspirants, they are expressing their willingness to follow EU rules and regulations in water sector. Needless to say that countries of the first group (Spain and Greece in particular), and to a much lesser extent those of the second, benefit from the financial support from EU in building water infrastructure to comply with its regulations. That is a significant factor that helps them to reduce water shortages.

Some parts of the sub-region are, or have been, in the situation of political instability and war. Water was not the root cause of these instabilities, but the war seriously disrupted, slowed down or worsened the development of water sector in the affected countries. During the war in Croatia, some dams were mined and only luck has prevented grave consequences for the surrounding population.

2.3 Economic changes

There are significant variations in GDP levels among Northern Mediterranean countries (Table 8). Better economic status, generally reflected in a higher level of GDP, could open many opportunities for the development and management of water sector. Higher GDP levels generally point towards smaller share of water used in agriculture because of the diminished importance of agriculture in the overall economy, better state of water technical systems including the decrease in water losses, better awareness of the population of the water issues, increased transparency in water management, better possibilities for water infrastructure investments, etc. However, it has to be noted that in all countries the share of agriculture in their GDP is significantly lower than the agriculture's share of the water used.

Contrary to the above, the lower level of economic development significantly reduces the development opportunities, which could have negative impacts on the status of water resources. Among other things, smaller level of economic development certainly



	GNP per Capita (US\$)			GNP Distribution 1991			Gross Domestic Investment (% of GDP)		
	1975	1990	1993	Agric.	Ind.	Serv.	1975	1990	1993
Turkey	910	1660	2130	18,0	34,0	49,0	23,2	23,1	/
Albania	/	/	340	/	/	/	/	/	/
Bosnia & Herzegov.	/	/	/	/	/	/	/	/	/
Croatia	/	/	/	/	/	/	/	/	/
France	6540	19750	22360	3,4	29,0	67,6	/	/	/
Greece	2590	6020	7390	17,0	27,0	56,0	27,0	19,9	/
Italy	4020	17170	19620	3,2	33,3	63,5	/	/	/
Slovenia	/	/	6310	/	/	/	/	16,90	/
Spain	3010	11180	13650	5,3	33,0	59,7	/	/	/
FR Yugoslavia	/	/	/	/	/	/	/	/	/

Table 8.
Labour Force and Economic development indicators.

Adapted from: Habitat, 1996. An Urbanising World: Global Report on Human Settlements, Nairobi: Habitat.


reduces the employment opportunities and flexibility for labour force to shift from one employment sector to the other. Because of that, very often the labour force stays within those sectors that are characterised with the less efficient use of water, such as agriculture.

Some of the countries of the sub-region are going through a transition process from socialist to the market economic system. Structural transformation in the first phase of that process had resulted in significant reduction of economic activity, with mixed results that include decrease of internal investment opportunities, worsening of overall economic situation (including the decrease of GDP), and higher unemployment. These processes certainly had impacts on the status of water resources. On the positive side, it has brought definite decrease in water demand, as well as improvements in the environmental state of ecosystems because of reduced industrial activity. On the negative side, it has brought reduction of investment activity in improving the water system networks and in development of water resources development. Consequently, the international financial institutions have placed improvement of water supply and reduction of pollution at the top of their investment priorities in the transition countries.

2.4 Social changes

Water is a cultural issue in many countries of the sub-region. In many countries it is considered that water is a public good and that it should be accessible to everyone, and that only at a cost that reflects only a fraction of the full cost of water development, production and distribution. This attitude is largely present in rural areas where agriculture is the major economic activity, and where water for irrigation is usually heavily subsidised by the State. Keeping the cost of water artificially low is also a policy tool used by several subregional governments to reduce migrations from rural to urban areas. The above has not contributed to the water conservation or more rational use of water resources in the sub-region. In urban areas, there is a growing trend towards charging the users the real cost of water, which is helping that water demand in the cities be reduced.

There is minimal action leading towards better transparency in water management. Public education aimed at awareness raising of the school children, better stakeholders' participation, awareness and information campaigns, training and capacity building etc. are only in their early stage and are not yet producing results that will positively affect the trends in water use. Generally speaking, a better education of the population could increase the awareness on the obstacles to more efficient water use, and on how to remove them in order to achieve a more efficient utilisation of water resources.



3. The objectives for sustainable water resources in the Northern Mediterranean Sub-Region

3.1 Vision on water (scenarios)

The Mediterranean Vision for Water, prepared by the Blue Plan, serves as the basis for the definition of objectives for sustainable water resources management. The vision presents three scenarios: conventional, crisis and sustainable one. Each one of these scenarios offers only a possible future, i.e. they show what would happen if the certain conditions in the process of their realisation would prevail. We have to keep in mind that the scenario is neither a strategy nor a plan. It is only a framework, which helps us to forecast future according to the conditions created by the decisions we make. The scenario also helps us to monitor changes in the implementation of the plan.

Following the structure of the Blue Plan water scenarios, Table 9 provides a summary of the two most probable scenarios for water in the Northern Mediterranean sub-region:

- conventional (trend) scenario, and
- sustainable scenario.

We consider that the third, crisis scenario is highly improbable in this sub-region and, therefore, it is not being presented here. Water is plenty in this area. Catastrophic events, such as sudden sea level rise, are highly improbable in such a short period of time. Neither are wars for water in this sub-region probable. The wars in the Balkans recently, have clearly shown that there was very little impact on the water situation in that part of the sub-region.

3.2 Objectives for the sustainable water future

The scenarios show that we could not expect sudden changes in the water sector, or events of large water crises in the sub-region in the next 25 years. If appropriate measures and actions will be taken, we could have a slow evolution towards a sustainable water future.

The actions will have to be based on the following core objectives:

- To continue improving, where existing, and introducing, where they don't exist, the measures of water demand management, in order to increase water supply security, particularly through water conservation and more efficient utilisation of water resources;
- To continue efforts in introducing Integrated Water Resources Management across the whole sub-region. This approach will help bringing together the totality of societal interests and better link water consumption with available water resources, decreasing the pressure where the resources are most critical;
- To introduce the practice of integrated environmental management particularly in coastal areas and adjacent river basins of the sub-region, which will secure equal attention to terrestrial and marine parts of the sub-region, as well as link river basins and coastal areas.

The specific technical objectives are the following:

- Increase water use efficiency throughout the whole sub-region;
- Introduce drought, pest and salt resistant crops in water scarce parts of the sub-region;
- Introduce forms of the non-conventional uses of water, particularly through re-use and desalination of water, in the water scarce parts of the sub-region, as well as in locally critical areas (large urban areas and tourism areas) of other parts of the sub-region;
- Reduce pollution of water sources as well as coastal waters by reducing water demand and by constructing sewage treatment facilities at the level that will optimally correspond to the economic development level;



Dimension	Trend Scenario	Sustainable Scenario
<ul style="list-style-type: none"> Population <ul style="list-style-type: none"> 2010 2025 Specific pressures Economy 	<ul style="list-style-type: none"> 270 millions (UN Projected) 280 millions Coastal areas Turkey Regular growth in EU countries; irregular growth in other countries until 2010, sometimes based at resource overexploitation (tourism); later steady, particularly if countries accepted in EU 	<ul style="list-style-type: none"> slightly lower slightly lower "sustainable" growth (protection and conservation of resources, and economic growth)
Prospective of total water demands Needed productions in km ³ /year <ul style="list-style-type: none"> 2010 2025 	<ul style="list-style-type: none"> 219 (Blue Plan projections) 243 (Blue Plan projections) 	<ul style="list-style-type: none"> 159 (Blue Plan projections) 145 (Blue Plan projections)
Drinking water supply for communities	Steady demand (constant 16% of total demand), increased supply security	Total demand reduced, share steady (constant 16%), better efficiency
Irrigation	Limits in new development and investments, share steady at 48% of total demand in both years, better efficiency	Reduction of demand (46% in 2010 and 45% in 2025), savings enough to cover eventual excess demand in community supply
Water management	Moderate evolution; big hydraulic works; big water transfers dominant action Privatisation in EU; slow privatisation in other countries	Stabilisation of supply; small hydraulics works; moderate water transfers Privatisation of water distribution dominant process
Non conventional water production	Occasional interventions; desalination practically non-existent; re-use moderate	Stronger re-use, particularly if coupled by reduced cost
Demand management	Slow water savings particularly if not followed by respective tariffs	Substantial water savings; flexible tariffs; better adaptation of water quality to needs
Pressures on resources		
<ul style="list-style-type: none"> quantity exploitation index quality 	<ul style="list-style-type: none"> 50 to 100%: no countries in 2010; 2-3 countries in 2025 local overexploitation only (urban agglomerations or tourist areas) Partly controlled or reduced pollution in EU countries; still a problem in other countries 	<ul style="list-style-type: none"> 50 to 100%: no countries in 2010 nor in 2025 overexploitation stopped General control and reduction of pollution
Water conservation and quality protection policies	Water quality and water conservation a priority in economically developed group of countries; in economically less developed countries equal priority with water supply	General priority throughout the whole sub-region

Table 9.
Water vision for the Northern Subregion (Based on the blue plan Mediterranean Water Vision).

Adapted from: The Blue Plan. 1999. Mediterranean Vision on Water, Population and the Environment for the 21st Century. Sophia Antipolis: The Blue Plan.

- Renew and preserve sub-regional ecosystems by securing the compatibility of uses and preventing the overexploitation of water resources;
- Improve flood protection in water plenty parts of the sub-region;
- Introduce cleaner production technologies.

The specific socio-economic objectives could be the following:

- Use economic opportunities to achieve sectoral employment shifts that will secure optimal employment structure in order to reduce water demand and prevent water scarcity crises in the future;
- Reduce water consumption in agriculture in water scarce areas of the sub-region by reducing subsidies and creating employment opportunities in other economic sectors, as well as by stimulating the use of treated municipal wastewater for agriculture;
- Gradually remove trade barriers in agriculture and introduce alternative policies for regulation of subsequent environmental and social impacts;
- Increase efficiency of existing management structure in economically developed parts of the sub-region, and improve management practices;
- Introduce participatory water management and increase transparency;



Summary of key sustainability issues

- Water abundant, but some parts face persistent water shortages
- Level of exploitation has not reached dramatic proportions, but expensive solutions for water supply should be avoided
- The role of agriculture and its use of water has to be re-evaluated
- Water losses in the network are large, reduction will reduce water demand
- Threats from untreated waste water discharges endanger water resources
- Water conservation efforts crucial for curbing water demand
- Natural disasters risk management is not high on the agenda
- Integrated Water Resources Management based on stakeholders participation in decision making
- Institutional frameworks have to be reinforced

- Keep investments in water sector steady but flexible with regard to shifting priorities;
- Bring water tariffs closer in line with the economic cost of water development, production and distribution in economically less developed parts of the sub-region;
- Reduce subsidies and bring political objectives more in line with the economic realities.

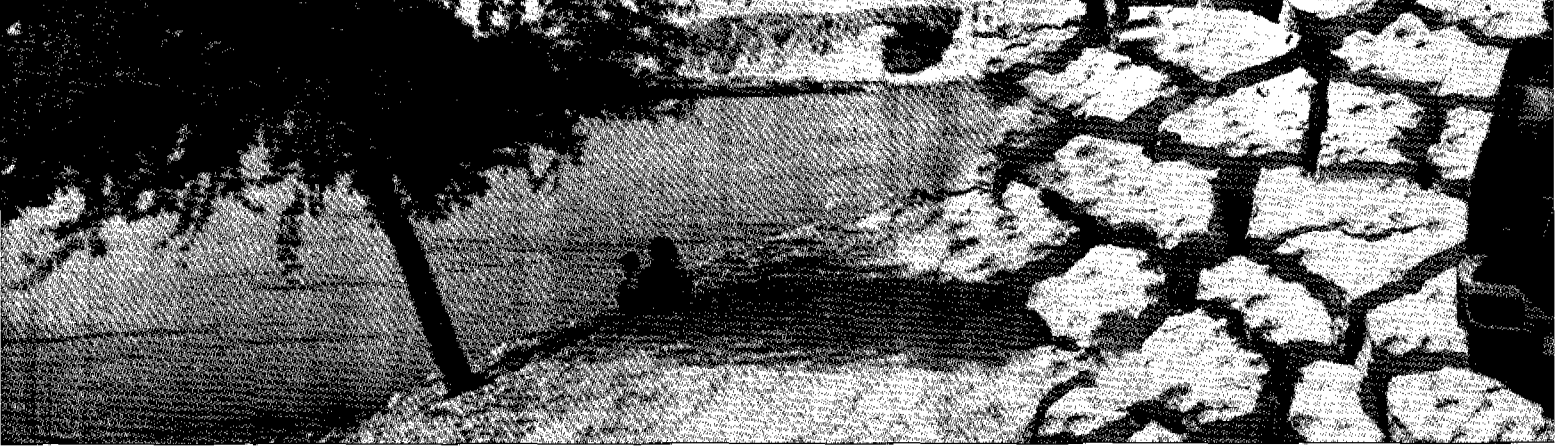
3.3 Key sustainability issues

- In spite of the good availability of water in most of the parts of the sub-region, stable population growth, and good economic situation in most countries of the sub-region, there are still some areas (coastal areas, and large urban agglomerations, in particular) where there are water shortages. They are the result of either local natural conditions, or they are being induced by the specific socio-economic practices (dominant agriculture in dry areas, or sudden increase of tourism, or large migrations to large, particularly, coastal cities). These practices are evident in the form of increased pressures on water resources. These situations require the implementation of an integrated approach to water resources management, which will bring together all the differing sectoral interests, assess equitably water needs, and propose alternative solutions aimed at satisfying the interests of all stakeholders in the water sector.
- Level of exploitation of water resources has not, generally, reached dramatic and critical proportions. Therefore there is no widespread need (except in some specific situations in coastal areas) for costly alternative solutions to provide water (transfer, desalination). In some cases there is even an over-investment in providing for new sources of water. These situations should be avoided without reducing, though, optimal levels of the provision of water. Expensive future water schemes should be well analysed in advance from the social, economic, political and environmental points of view before final decision will be made (the case of the construction of trans-boundary water transfer schemes).
- The role of agriculture, particularly the irrigated one, should be re-evaluated. Its economic and social impacts should be analysed. No measures could be taken before all impacts are being analysed. Otherwise, there will be a risk of grave socio-economic disturbances in some countries of the sub-region. New agriculture will have to be more flexible with regard to crops, export role, employment opportunities and environmental impacts. Re-sized agriculture with regard to the water it could use, offers great opportunities for water savings or for redistribution of those savings to other sectors where consumption of larger quantities of water is economically, socially and environmentally more feasible.
- Drinking water supply reaches large majority of the population in the sub-region. However, the water supply security differs significantly among many parts of the sub-region. Losses of up to 70% of water point to poor maintenance or old age of networks. That is a great waste of resources. Lack of improvement in this sector could bring future water shortages in the areas where, otherwise, it should never occur. Good practices in some areas where water distribution services have been privatised and where it was in the interest of water providers to reduce losses in order to increase their profits could be replicated elsewhere. A number of water saving incentives could be implemented in this field.
- The percentage of households connected to sewage networks is relatively high. However, there is a lack of appropriate sewage treatment facilities, particularly in less developed parts of the sub-region. This situation poses two dangers for water resources in the sub-region. The first is a direct threat that untreated sewage poses to the underground and surface water resources, particularly when haphazard settlements are spreading around water drainage basins. The second danger is when non-treated sewage is discharged into marine ecosystems, as well as into wetlands and other transitional ecosystems, which are crucial for maintaining ecological balance. All efforts should be employed to prevent further ecosystem deterioration, as well as to recover destroyed ecosystems and water resources.
- Water conservation and water demand reduction measures are not implemented



equally all over the sub-region. They should include better education, information, awareness raising, incentives, penalties as well as introduction of new technical measures. Very often, population is totally unaware of high water losses. Introduction of higher tariffs could, in many cases, be done only gradually. Assistance of the international financial institutions is, very often, crucial in acquiring necessary resources for water conservation. However, the objectives of the financial institutions and local authorities are often at the different ends of the scale, since the former are more inclined towards the improvement of the existing networks, while the latter are in favour of new investments (this dichotomy became evident in the city of Durres in Albania). Better information and financial transparency could help in solving this confrontation. Alternative water networks using lower quality of water for street cleaning, and parks and gardening is a potential solution, but only there where good financial and technical possibilities for that exist.

- Risk management is not developed in many countries of the sub-region. Floods and other water related natural disasters are not being confronted by adequate risk management measures. Considering the size of damages inflicted by these disasters, the lack of mitigation measures could be considered as a hindrance to sustainable development in the sub-region.
- Integrated Water Resources Management is an encouraging opportunity. However, it will succeed only there where there are good opportunities for active and effective stakeholders involvement. Although water planning at the strategic level exists in almost all countries of the sub-region, the management system that will allow for full integration of interests of all stakeholders is missing. Technically, there is a widespread agreement that river basin level type of management is the most appropriate one, but an effective integration of coastal areas management into that system is missing.
- Institutional framework is too fragmented, and co-ordination mechanisms are too complex. It is evident that water is too interesting sector to be left untouched by many. Different government ministries and agencies deal with many sub-sectors of the water sector, without too many linkages among them.



Country	Water shortages	Level of exploitation of water resources	Role of agriculture	Drinking water supply coverage	Sewage treatment levels	Water conservation	Risk management	IWRM	Institutional
Spain	Large part of Mediterranean coast is facing shortages. Aggravated by irrigation. Some coastal urban and tourist settlements also endangered.	Surface water, largely exploited. Groundwater: local overexploitation. Possibility for as emergency supplies.	Agricultural economic sector of relatively minor contribution to GDP and employment, but consumption of water high. Export crops high. Consumers. Change needed.	High coverage. Distribution systems improved after privatisation. Water losses low in main cities but room for further improvement in most middle and small sized cities.	Improvement underway at high speed to meet EU 271/91 Directive. Pollution prevention and denoatation plans in specific sectors underway. Monitoring of water quality and pollution in place.	Economic instruments (conservation pricing) implemented in most urban areas. In agriculture major measures to improve physical efficiency of water use underway (irrigation plan) but conservation pricing in agriculture needs to be generalised. Barcelona plans to use lower quality water. Other measures slowly being introduced.	Needs improvement particularly drought management plans.	Water management at river basin level since 1929. Long term water resources management plans for each Basin Authority. Water laws for IWRM since 1985. Water irrigation associations since 1890's. Stakeholder participation for water users in Basin Authorities. Basin and Natural Water Councils with advisory functions and wide stakeholder representation in place. Water use rights and emission permits in place.	Fragmented responsibilities among different ministries. Water distribution privatised in main cities. Need to move from water resources development to water resources management in Basin Authorities. Reinforce the regulatory and water management functions of Basin Authorities (Comisarias de Agua).
France	No significant water shortages. Seasonal variations possible due to tourism.	Situation is not critical. Transfer of water from the Alps.	Agricultural economic sector of minor importance. Relatively efficient irrigation. Local management schemes.	Total coverage. Distribution systems improved after privatisation. Water losses low.	Good.	Economic instruments implemented and water used for domestic purposes reduced. Other measures slowly being introduced.	Good.	River basin management in place. Long term water management plans implemented (SDAGE). Strong financial support. Need for larger integration of other sectors in SDAGE. Coastal areas integrated in IWRM. Legislation in place.	River basin committees established with large financial powers (RMC Basin Committee has a yearly budget of FFR 5 bill.). Water distribution privatised.
Italy	South of Italy is facing severe shortages. Aggravated by irrigation. Some coastal urban and tourist settlements also endangered.	Not critical in the north and central Italy. In the south surface water largely exploited.	Agricultural economic sector of relatively minor importance, but consumption of water high, particularly in the south. Change needed.	Total coverage. Distribution systems improved. Water losses low in the North, while in the South up to 70%.	Adequate in coastal areas. Problem is large input of nutrients from river basins to the Adriatic Sea, having wider consequences.	Economic instruments implemented and water used for domestic purposes reduced. Other measures slowly being introduced.	Needs improvement in flood management.	River basin authorities. Water law since 1994. Decentralisation of water mgmt. Water distribution separated. No long-term water mgmt plans.	Fragmented responsibilities established with water development, supply, distribution and protection. River basin authorities established.
Greece	Occasional shortages in tourist settlements in summer.	Not critical.	Agriculture large consumer. Medium efficiency of water use. Rural areas politically important-development stimulated. Irrigation is under priced.	Relatively high coverage. Medium water losses.	Slowly improving, some tourist areas threatened.	Water pricing brings reduced consumption. In agricultural areas slow progress.	Needs improvement in flood management.	River basin authorities. No plans. IWRM in its infancy.	Ministry of the Environment, Planning and Public Works responsible for water resources management.
Croatia	Abundance of water, but some cities on the coast face shortages, due to poor infrastructure and tourist variations.	Low.	Agriculture on the coast low priority. Irrigation practically non-existent. Consumption of water in water parks high.	High coverage. Medium losses of water. In need of improvement.	Low in karstic areas. Water quality endangered. Big investments planned in coastal cities.	Slow progress towards water conservation. Consumption reduced because of higher prices.	Flood protection in coastal areas not adequate.	Water basin authorities established. Legislation exists. Long-term plans in preparation.	New institutional framework envisages integration of responsibilities in water sector in Ministry of Public Works and Ministry of Environment.
Bosnia & Herzegovina	No shortages.	Low.	Irrigation minimal (12,000 ha). Needs estimated at 180,000 ha.	High coverage. Water losses high. Improvements urgent. Redistribution of water needed.	Low. River pollution, and sea pollution endangering ecosystems in Croatia. Industrial pollution of rivers.	Slow progress towards water conservation.	Major rivers protected through system of dams. Low flood protection in coastal areas.	Watershed authorities. No IWRM.	Water management fragmented among ethnic units. Establishment of River Basin Authorities proposed.
Albania	Abundance of water but severe shortages in cities; bad maintenance of water supply systems; large water losses.	Low.	Irrigation systems destroyed. During transition period agriculture diminished. Consumption of water high.	Relatively high coverage. Water supply system in critical situation, intermittent supply, water losses high. Improvements urgently needed.	Critical. Water resources, coastal waters and natural habitats highly endangered.	Slow progress towards water conservation.	No flood protection plans and measures.	No IWRM.	Water management fragmented.
Slovenia	No shortages.	Low.	Agriculture low priority. Irrigation almost non-existent.	High coverage. Medium losses of water. In need of improvement.	Dangers in karstic areas. Needs improvement, treatment levels relatively low.	Slow progress towards water conservation. Consumption reduced because of higher prices.	Flood protection measures in coastal region.	River basin authorities. Legislation exists. No long-term water mgmt. plans. Need for IWRM recognised.	Ministry of environment integrates water sector.
Turkey	Occasional shortages in coastal tourist settlements in summer.	Not critical, except in large cities, where expensive water transfer schemes are planned (Istanbul, Izmir).	Agriculture large consumer of water. Middle level efficiency of water use. Rural areas politically important. Local management schemes.	Medium coverage. Low in rural areas. Medium losses of water. Privatised water companies starting with improvements in conveyance systems.	Many coastal natural habitats threatened. Some watersheds endangered by urbanisation (Izmir). Sewage systems require large investments.	Slow progress.	Needs improvement in flood management.	No IWRM.	Ministry of environment responsible for water protection; State Water Works (DST) responsible for water management.

Table 10.
Key Sustainability Issues in the
North Mediterranean Countries.



4. Framework for action

4.1 Strategic options

Resource management strategies, in general, are coherent statements indicating how particular resources would be developed, and what is the approach that would have to be taken to achieve one or more management objectives successfully. The principal objective for the future water management in the North Mediterranean sub-region is to ensure steady supply of water, based on achieving a balance between water supply and demand in all of its areas, and to make future use of water economically feasible in order to realize sustainable development in the sub-region.

Realisation of the water vision requires that a certain number of strategic principles be followed, such as:

- in a sub-region with relatively large degree of uniformity with regards to availability of water resources, but with so much socio-economic diversity, it is practically impossible to provide unique strategic option that will provide solutions for all pending water issues all over the area, hence the necessity to concentrate on key issues, as well as to propose a range of strategic options for water resources management;
- the strategic options have to be cross-cutting in nature, therefore capable of securing highly integrated solutions, with the aim of involving a variety of interested socio-economic sectors as well as stakeholders;
- the proposed strategic options have to be, on one hand, comprehensive enough to encapsulate most of the problems in water sector, as well as have a wide geographic coverage; however, the packages of actions in each of the options, on the other hand, have to allow for the possibility of adjustment to local situations and conditions;
- the strategic options have to be based on an assessment of local situations in order to find what are good existing practices and what could work in the future water resources management in the sub-region; improvement of such practices, and replication of successful approaches will make this strategic option implementable.

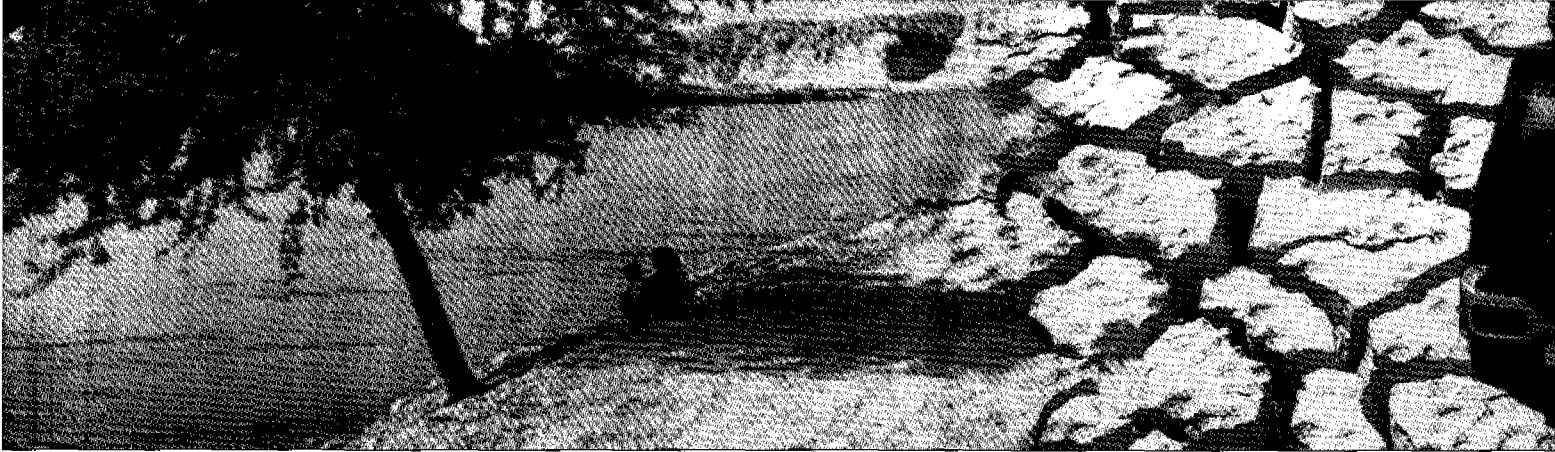
The strategic options proposed are the following:

- Introduction of Integrated Water Resources Management (IWRM)
- Increase of water supply
- Improvement of freshwater and coastal water quality and the ecosystems' health
- Improvement of water supply efficiency
- Mitigation of natural disasters' risk

4.2 Strategic option: Introduction of integrated water resources management

Sustainable water vision could be achieved only if Integrated Water Resources Management (IWRM) becomes the standard practice. IWRM is a continuous, proactive and adaptive process of water resources management focusing on establishment of linkages between water sector and all other relevant social, economic, environmental, institutional, financial and political sectors in any society. As the different economic and social actors use water resources simultaneously, IWRM can only be accomplished when all these uses, users and their relationships are clearly known. Water demand management is a crucial ingredient of this approach. IWRM should be enhanced there where it is already being practised, and introduced as standard practice there where it hasn't existed already.

It is expected that the application of IWRM will limit demand for water in all sectors, reduce pressures on water resources, contribute to the improvement of water quality, reduce scarcities of water in coastal and dry area, help facilitate the reallocation of water resources among users, and bring change in the social perception towards water.



IWRM is a new approach towards managing water. It anticipates cultural change in the society towards water. Therefore, it doesn't necessarily require big material investments, but an effort, political support and commitment of all stakeholders to change the existing and unsatisfactory situation with regard to water in a certain society. IWRM as an approach to the development, management and use of water resources, endeavours to unite the entire set of conditions and means for the assessment, planning and development of water resources to satisfy, in a rational manner, the water demands. It involves comprehensive monitoring, effective protection and conservation of water resources through their efficient operation and rational use. It strives to act in the best interests of society and aims to achieve sustainable development by taking into account the role of water in the formation and regulation of local and regional (sub-national) socio-economic and environmental processes.

4.2.1 Actions

The following actions are required:

Institutional

- Implementation of IWRM on a river basin level. Besides EU countries, where a water directive requires such an approach, this approach is also being followed by some other countries in the sub-region (Slovenia, Croatia, Bosnia and Herzegovina). The approach requires adoption of clear legislative measures that will make the tasks and powers of river basin organisations (RBOs) clearly defined, but also allow for their integration into a more holistic management system (forestry, agriculture, fisheries, coastal areas management, etc.), as well as allow participation of all stakeholders with interests in water management. RBOs are usually in charge of maintenance of water resources and not of water distribution and maintenance of water systems, thus avoiding the monopoly status and leaving the government to act as regulator. One clear task of RBOs is planning for development and use of water resources. One clear example is SDAGE in France. Managing role of RBOs will have to be accompanied by clear financial means to fulfil their task. Committee for the River Basin Rhone-Mediterranean-Corsica has FFR 5 bill, yearly to implement the plan. In Italy, RBO's planning role is more limited. In Croatia, RBOs have large powers in managing and planning for water resources.
- Reorganisation of water bodies to allow IWRM to be implemented. This means creating co-ordinating commissions on an inter-agency level (Water Commissions). Their integration has to be based on clear inter-agency agreements otherwise voluntarism will prevail.
- Change of focus of water bureaucracies. If water is to be one of the most important resources, then higher importance has to be given to it in government hierarchies. In less developed countries of the sub-region (Bosnia and Herzegovina, Albania) water bureaucracies have to re-orient their focus from engineering aspects to water management and regulatory functions. That will allow for wider participation of all interested parties in water management and specialisation. There has to be a change of focus from the priorities such as realisation of public works to priorities such as resource management implying better control, permanent monitoring and analysis of the situation, and more efficient enforcement of legislation on water quality. Political support at the higher levels is crucial to the success of this proposal. This usually goes hand in hand with raising the standards of democracy.
- Decentralisation of water management. IWRM requires decentralised water management system, including transfer of responsibilities in management of drinking water system, sanitation facilities, irrigation drainage, flood control, energy production, nature protection, etc. Decentralisation has to be coupled by definition of clear legislative powers of each partner, devolution of revenue system, provision of enforcement powers. A system of co-ordination among these partners has to be put in place. In Croatia such system already exists but is very often distorted by political priorities if, for example, two partners who are supposed to co-operate are under the jurisdiction of different political and opposing parties (in the



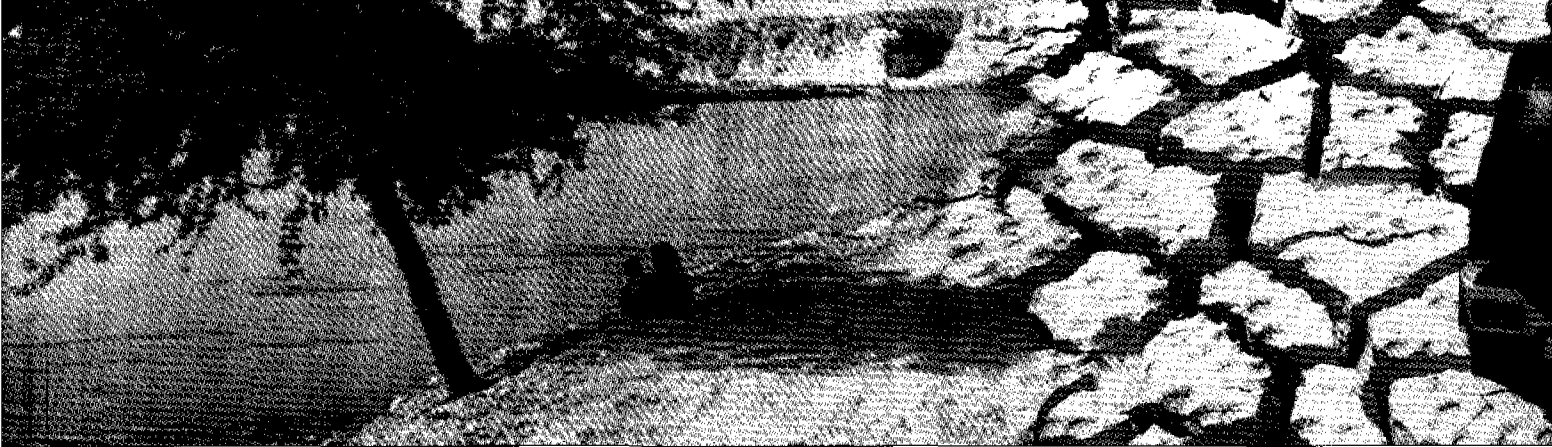
region of Split, thus, RBO is under the jurisdiction of a central government, while municipal drinking water company is governed by the opposition party). Such clashes should be avoided by any cost. Local water management organisations, particularly in agricultural areas (Turkey, Greece, France), are a good example of water management and "bottom up" stakeholders' involvement.

Socio-economic

- Re-allocation of water resources. This is potentially very effective action provided that an adequate procedural system for water re-allocation is put in place. Some sectors, using large quantities of water, are economically quite inefficient and, theoretically, water could be put to a much better economic use. For example, agriculture in many countries of the sub-region is using much more water than is its contribution to the countries' GDP. However, there are strong social and cultural elements that create conditions for such an allocation of water, and which should not be easily discarded in the future. For example, the existing agricultural practices create conditions for the social, cultural and environmental conservation of rural landscapes and ecosystems. Also, some countries are less elastic in shifting water allocation because of low level of overall economic development. It is widely believed, for example, that tourism is the most promising development sector that could automatically accommodate surplus labour from reduced agricultural activity elsewhere in that country. However, if the overall economic situation is not good, there is very little chance that tourism could take that role. It could be concluded, therefore, that there is a need for re-allocation of water resources, but the system of doing so would take in consideration a number of elements, such as: sectoral contributions of particular economic sector to the GDP; sectoral shares in exports; percentage of rural population; capacity of sectors to pay for extra water they may get; possibility of transfers of water from other uses and not only from irrigation; endogenous improvements in the irrigation practices (efficiency of water use, introduction of new crops, change of the agricultural exports structure, etc.); assessment of the need for achieving internal food security, etc. Concrete measures to be taken could be the following: preparation of long-term plans to change the structure of water use; economic measures such as setting up markets for surface water, transferable water rights, water auctions, setting up markets in groundwater; training and education of farmers on efficient use of water; training and education in other sectors, particularly in tourism, on efficient use of water; preparation of rural development programmes; etc.

Technical

- Inclusion of coastal areas in IWRM's geographical and activities' scope. Integrated Coastal Areas Management (ICAM), in a narrower sense, and Integrated Coastal Area and River Basin Management (ICARM), in a wider sense, are logical conceptual and practical extensions of IWRM. Coastal areas and river basins are linked through a number of natural and socio-economic processes: the cycle of water which determines fresh water quality and quantity as well as sea water quality; sediment transport which affects river channel and coastal zone dynamics; and human activities in river basin that affect coastal ecosystems and human activities in the coastal zone. An integrated approach in this wide zone leads to better co-ordination of policy making and action across sectors and to a recognition of key linkages between coastal areas and river basin systems, leading to a more rational use of resources and more effective environmental protection. Good example of this approach, albeit on a very large scale, is SDAGE of the Rhone-Mediterranean-Corsica Region in France. This management plan regulates the use of water as well as provides the framework to maintain the quality of fresh and seawater throughout the whole of French Mediterranean coast, as well as the Alps, from where large amounts of water are being transported. There are attempts at similar approaches for the river Cetina, encompassing its basin in Croatia and Bosnia and Herzegovina. That river supplies water to a large part of the Croatian coastal area and many of its islands. Other similar projects are in the pipeline in the sub-region.



**Summary of actions aimed
at the Introduction of Integrated
Water
Resources Management**

- Implementation of IWRM on a river basin level
- Reorganisation of water bodies to allow IWRM to be implemented
- Change of focus of water bureaucracies
- Decentralisation of water management
- Re-allocation of water resources
- Inclusion of coastal areas in IWRM's geographical and activities' scope
- Improvement of the understanding of and knowledge on water resource systems
- Introduction of water demand management
- Improvement of the legislation
- Training for all aspects of water management
- Public awareness raising
- Research programmes

- Improvement of the understanding of and knowledge on water resource systems. Full and detailed understanding of the water resources available and their behaviour should be maintained, including: development of reliable meteorological and hydrological monitoring networks, using existing systems, or installing new networks; keeping an inventory of available water resources; making assessment of the future water needs and demands, including use of different scenarios as management tools; hydrological modelling using GIS; optimum reservoir operation, decision support systems, etc. These measures will help achieving optimal management of water, and help avoiding crisis situations.
- Introduction of water demand management. Developing more new and conventional sources of supply to meet the rising demand in many instances is not a viable option. Managing water demand is a powerful option. Water demand should not be rigid: it can change depending on the technological progress, climatic situation, or water supply conditions. In order to minimise costs and to avoid anticipating investments, it is imperative to use a better approach to evaluate water demand for all uses and users, as well as to implement better parameters of variation and ratios which enable it (peak and loss coefficients, ratios) and to avoid uncertain approximations. Water demand management should use price of water as a tool, but also include technical means to stimulate lower consumption of water. Where appropriate, seasonal pricing and temporary drought surcharges should be imposed. Recycling, reuse and other technical means to reduce withdrawal rates for water in industry and agriculture can achieve good results. These measures have been implemented in Spain and France with relatively good success rates. Even the areas with abundant water should implement them since they could contribute to the rationalisation of costs of developing new water resources, but on the long run help avoid water shortages that today could not be envisaged.

Legal instruments

- Improvement of the legislation. The measures include improvement and modernisation of the legislation for water resources management. Legislation would include new principles such as "polluter pays", and relate to the river basin management, integrated coastal area and river basin management, public participation, environmental management, water and coastal area protection, etc.

Capacity building and research

- Training for all aspects of water management. Actions should include training for water professionals (in integrated water management planning; water demand management; economic aspects of water management; agricultural water management; use of GIS and remote sensing in water management; use of decision support systems; enforcement of water standards, effluent standards and regulations, etc.), building up of local and regional training capacity (support to national institutes that could provide training for local and national experts), and training of water systems users.
- Public awareness rising. This should concentrate on water scarcity issues, particularly in areas facing occasional shortages, as well as in the areas with high seasonality of demand (tourism and urban areas). There are many cases of such measures being implemented with varying success rates. However, efforts should be reinforced in education of school children from early phases of education.
- Research programmes. Efforts should be employed in introducing research programmes for areas and issues of which little is known, or on new sophisticated concepts of water management such as virtual water, green water etc. Results of research efforts should be widely disseminated, and if commercialisation of these efforts is an obstacle to it then it should be accorded the character of international aid.

4.2.2 Barriers to implementation

Because IWRM is, in its essence, a cultural issue, which implies the change of attitude towards water in a certain society, the process leading towards its full implementation



will be very slow. Also, a certain resistance towards its implementation could be expected from the political structures, as well as from the actors which had hitherto a major role in water management, because they will be losing their power and influence which, in many countries, has been quite considerable either in financial or in political terms, or both. IWRM will not always be easy to understand by many stakeholders. As in many other areas where the word "integration" is crucial, there is a lot of misunderstanding in defining its exact meaning. Very often it happens that it becomes "all things to all the people" meaning, in practice, that it becomes meaningless. IWRM is a time consuming process and it may leave some of the participants dissatisfied if they become restless, and the benefits do not become clear soon. Sometimes, it is not very well explained by those responsible for its implementation and then misunderstanding results. IWRM is about making choices, particularly where water re-allocation is at stake. It may create strong opposition from those that will be losing their water rights. And finally, IWRM is a costly process and financial difficulties may be faced in many countries. In order to create solid foundations for the IWRM process, some "kick-start" actions may be needed:

- Secure political commitment from the very beginning of the process. Major actors will have to publicly commit themselves to the process. This particularly refers to the former major actors in this area, which may be losing some of their influence in the water management decentralisation process.
- Prepare an action plan for the negotiation process within which a new management structure, compatible to IWRM, will be established and new roles defined.
- Prepare clear, simple and far-reaching public awareness campaign on the benefits of the IWRM implementation.
- Secure minimum financial resources for the start of the process.
- Prepare some actions which will quickly produce some results and that will prove to many that the process is beneficial and keep the momentum going.

4.3 Strategic option: Increase of water supply

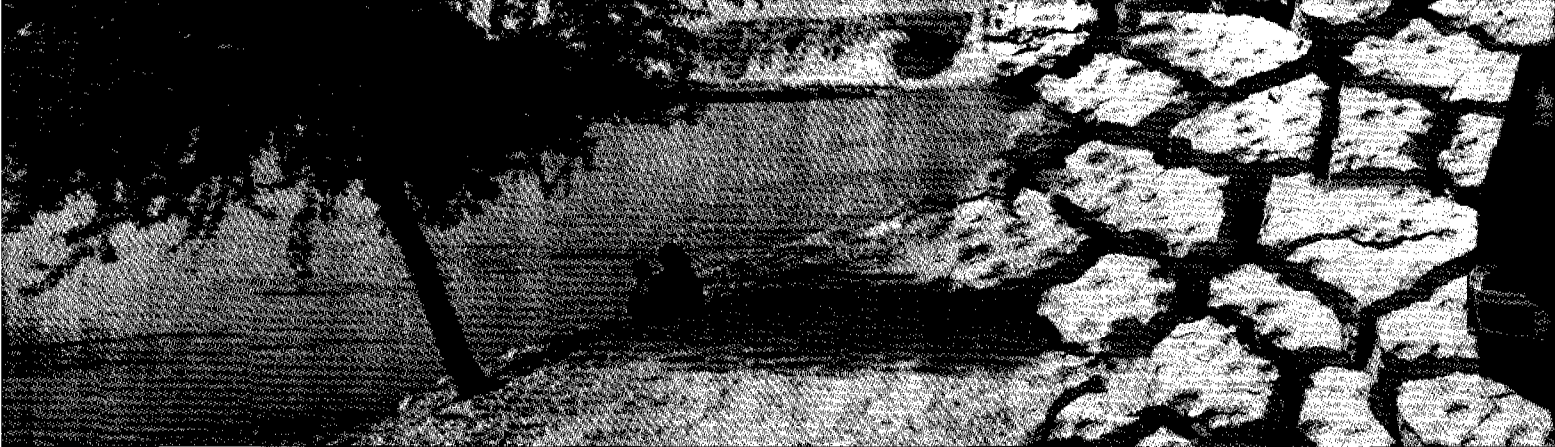
The growth in the overall water demand in the sub-region will continue because of the population growth and rise in the standard of living. This demand growth will be limited, though, since most of the countries will exhibit slow, or even negative, population growth (except Turkey). In spite of that, a number of areas will face water scarcity problems, such as large urban areas, and coastal tourist settlements. The strategy of increasing water supply will have to be implemented by using sophisticated methods aimed at increasing water supply to the final consumer where it will be needed, but without increasing the pressure on existing water resources. Also, more differentiated system of water supply, based on the differentiated quality of water provided for different purposes, will have to be introduced.

It is expected that this strategy will help reduce pressure on water resources, change structure of water demand, reduce cost of water provision, improve efficiency of water systems, secure steady supply of water, improve supply to seasonal water shortages prone areas, and improve quality of water provided. This strategy may be needed even there where measures of reducing water demand will be producing positive results. That will be the case in the situations where, for example, large increases in urban populations or seasonal variations of population in tourist settlements will offset positive results of the water demand management measures. Parts of the sub-region, such as large part of the Mediterranean coast of Spain or southern Italy, may have to resort to this strategy on a more permanent basis. The strategy requires development of conventional and non-conventional water resources.

4.3.1 Actions

The following actions may be needed:

Increase of water supply through non-conventional water resources



- Re-use of wastewater. It is not practised so widely across the sub-region. In some areas that are so because there are no sewerage systems and/or because treatment plants simply do not exist. Re-use of wastewater is generally considered as one of the most economical auxiliary sources of water and it is expected to represent the main complement to the conventional sources of water in the future. Re-use of wastewater could also be an efficient measure of water quality control and protection. It also contributes to water conservation. Re-used wastewater could be utilised for irrigation or other purposes that do not require water of the highest quality. It could also be used for aquifer recharge, but the quality of re-used water has to be sufficiently high if the risk of pollution is to be avoided. To implement the above measures it will be necessary to increase efforts to build adequate waste water (tertiary) treatment facilities, particularly in less developed countries of the sub-region (Croatia, Bosnia and Herzegovina, Montenegro, Albania and Turkey). Areas suffering from chronic water shortages and with large agricultural sector and irrigation (Spain, Italy, some coastal areas of Turkey) should increasingly implement this measure.
- Use of lower quality water. Underground water found in urban areas is usually of a lower quality and not appropriate for drinking. It could be utilised for purposes that do not require high quality of water such as gardening, park maintenance, street cleaning, and other auxiliary urban purposes. This is a costly option because it requires high level of "know-how" and an efficient management system, as well as initially high investment costs to build an alternative water network. Therefore, it is more appropriate for developed parts of the sub-region. The city of Barcelona is seriously considering this option. Financing will probably have to be done through local administration budgets and, where applicable, as part of private water distributors' investment plans. Within this action, urban groundwater recharge through increased infiltration rate of urban precipitation could also be considered. That water could also be used for the abovementioned purposes.
- Water saving in irrigation. Irrigated agriculture is the biggest user of water in the sub-region, particularly in the areas where water shortages are frequent. Use of that water is not always economically feasible. Improving the efficiency of irrigation could create large savings. It is estimated that a reduction of several percent in water used in agriculture could cover the increased demand for all other purposes. If these savings could be achieved then there would be no need to develop new conventional water resources. It is important awareness levels on the need to save water in the rural areas be raised. Improved methods of decentralised local water management techniques in some countries of the sub-region have helped reduce demand for irrigated water, and these experiences could be replicated. Other measures include change of crops, improved irrigation methods, re-use of wastewater, etc.

Increase of water supply through development of conventional sources

- Transboundary water movement. This is highly expensive solution because it involves transfer of water over long distances, across the watershed or, even, state boundaries. Because of high cost, the action should be considered as a measure of the last resort. This solution could be available only to large urban areas with large resources to cover the cost of the intervention (Barcelona, Istanbul, French Mediterranean coast).

Economic measures

- Water saving incentives. Tariffing system based on the real cost of drinking water has been introduced, after the privatisation process, in most of the countries of the sub-region and has produced positive results. The pricing schemes have to be based on full cost recovery. Effectiveness of this incentive could be improved by linking it to other incentives such as: increasing unit charges when consumption increases (Barcelona), improving collection system (Turkey), subsidising poorer population when the cost of water is set equally for all consumers, etc. Real cost pricing for irrigation is a politically sensitive issue. It is not widely used, although it might be needed in order to give signals for water saving. It is expected that these measures could help re-allocating the water resources, and contribute to increasing water supply where it is needed and where cost recovery could be achieved.



4.3.2 Barriers to implementation

Cost would be the biggest barrier to the increase of water supply. Some of the measures would require significant initial investments, either to upgrade the existing facilities, to alter them to carry out new functions or to develop new water resources. Financing the implementation of these measures will be a considerable burden for the eastern countries of the sub-region. Another barrier will be the opposition to the reallocation of water resources, particularly in the rural areas of the sub-region.

The actions that could be taken initially to remove the barriers to implementation of the proposed measures are the following:

- Bring in the international financing institutions to help less developed countries in their transition towards more rational use of water resources. The measures could include grants, technical support, soft loans etc.
- Develop “quick start” awareness raising programs and involve water users associations in their implementation.
- Speed up the implementation of economic instruments that will induce the rational use of water resources.

4.4 Strategic option: Improvement of freshwater and coastal water quality and ecosystems' health

Quality of ground and surface water is essential for water supply. Because of increased pollution from domestic, industrial and agricultural sources, as well as of uncontrolled water abstraction (particularly in coastal areas), the required quality of water is threatened, and other sources of water have to be sought for, often at an increased economic cost. This strategy requires improved control of effluents, better planning and control of urban development, increased investments in waste treatment, reduced use of agrochemicals, recovery of marine and terrestrial ecosystems, recovery of water resources, etc. The strategy is aiming specifically at coastal areas where the problems of water quality are most pronounced.

Major objectives to be achieved by implementing this strategic option are to protect and rehabilitate water resources, as well as to protect and improve the state of natural habitats and coastal waters whose deterioration is a result of discharges of untreated or inadequately treated waste waters (domestic, industrial, tourist, etc). Communities are becoming increasingly aware of the water quality issues and the quality criteria are becoming ever stricter. Coastal areas (sea water and adjacent freshwater resources) are particularly sensitive to contamination. Their aquifers are invariably related to the sea and subject to salinity problems. They are at the end of river systems and are the end users of water suffering from the impacts of upland cities, industries, forestry, and agricultural activities. A fundamental notion underlining water resources management with regard to water quality is, first, the integration (IWRM) and, second, watershed approach, therefore the need for Integrated Coastal Area and River Basin Management (ICARM).

The implementation of this strategy could help improve the quality of water systems, increase the availability of water, reduce requirements for new water resources, improve opportunities for economic development of the pollution affected areas, restore coastal marine, transitional and terrestrial ecosystems, and rehabilitate water resource systems.

4.4.1. Actions

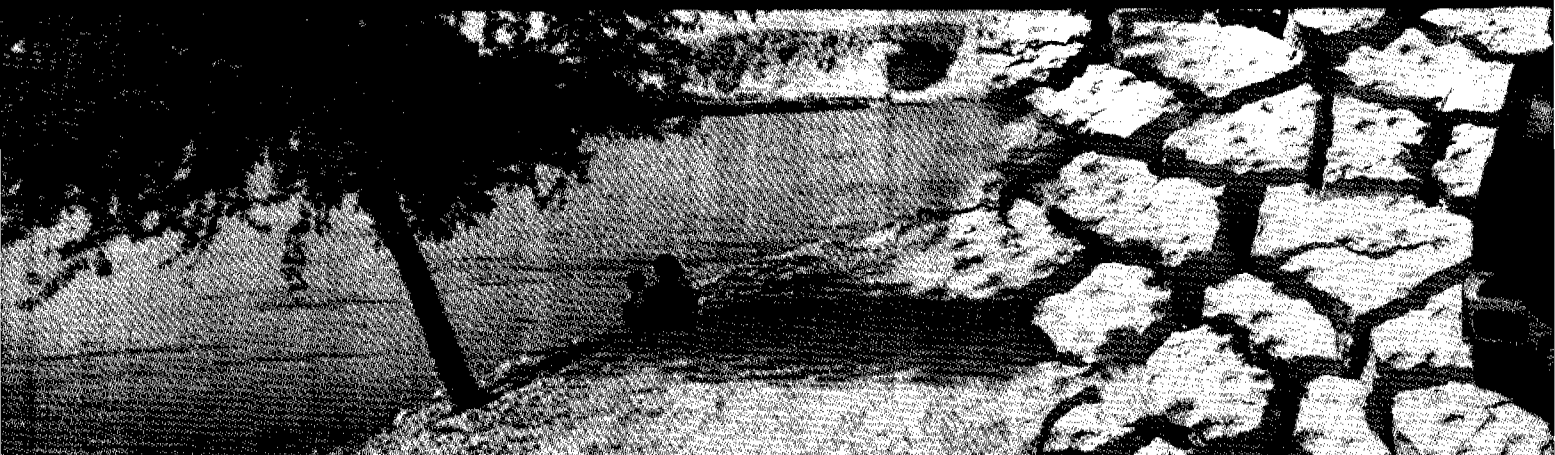
The following set of actions is proposed:

Pollution reduction and prevention management

- Reduction of pollutants' generation. Adopt and implement measures that would help control and reduce generation of pollutants at the source, such as introduction,

Summary of actions to increase water supply

- Re-use of waste water
- Use of lower quality water
- Water saving in irrigation
- Transboundary water movement
- Water saving incentives



of clean technologies, recycling of wastes, etc. The implementation of measures will be accompanied by adequate institutional arrangements (monitoring, inspection, enforcement).

- Preparation of comprehensive pollution prevention plans. This is a major prerequisite for the effective protection of water resources. The plan has to take in consideration all point and diffuse sources of pollution, pollution processes and dynamics, land use, urbanisation processes, consequences of pollution, and institutional and economic measures needed to implement the plan. For coastal water resources, the plan must include the protection of the coastal sea from pollution brought in directly and indirectly. Special attention should be paid to sea intrusion of coastal aquifers and measures such as limits to the aquifers' exploitation, combined use of surface and ground waters, building barriers, etc.
- Treatment of municipal and industrial wastewater. Large number of settlements in the sub-region lacks adequate wastewater treatment facilities. That results in high level of pollution. In some countries urban development poses particular problems because many un-planned settlements, usually with non-existent waste treatment, are located within the perimeters of sensitive aquifers. Large investments are needed to improve this situation. EU countries should follow strict EU regulations and install facilities commensurate with the standards adopted. Other countries will have to seek help from international community to install facilities that will treat wastewater and to ensure that effluent quality complies with quality standards. Soft or other loans to be repaid through increases in the price of water (the examples of cities of Izmir, Split, Pula etc., show that this could be done). Situation in Albania is extremely difficult.
- Limited use of agrochemicals. Use of agrochemicals is one of the biggest sources of non-point pollution. It is affecting surface and groundwater sources, as well as coastal waters and natural habitats, either directly or via rivers. Adequate pricing of agrochemicals that would include cost of cleaning should be considered. Education of farmers is another powerful measure. They could be taught on the possibilities of increased income from organic agriculture, or of the methods of more rational use of agrochemical that could also bring significant financial benefits.

Contingency management

- Preparation of contingency plans. Plans have to propose necessary measures to provide for an effective response to accidental situations. Events may range from natural disasters, oil spills, industrial leakage, nuclear plants incidents, terrorist acts, hazardous waste spills, breakdown of treatment plants, etc. Plans will have to have an inventory of possible incidents in a given setting, and propose procedures, institutions and necessary material means to contain accidental situations.

Economic measures

- Pricing for sanitation services. It is usually linked to the amount of water consumed. Charging could also be made on the basis of load or concentration of pollutants, if that could be controlled. Charges could provide incentives to reduce pollution. Revenues would allow generation of financial resources for construction of treatment facilities (successful project carried out in Split).
- Introduction of tradable discharge permits. An innovative measure. It requires close monitoring of pollution loads, an estimate of possible pollution loads and definition of permits among polluters. They are allowed to trade their permits, provided the total permitted load is not exceeded. It could reduce total pollution. Measure is limited to countries with developed pollution monitoring systems and could be costly to administer. Prior to implementation it is advisable to survey the interest among polluters.

Legislative measures

- Regulation of water quality. Adoption and implementation of water quality/effluent disposal standards for point and non-point sources of pollution. Implementation has to be simultaneous for all users. Matching inspection and enforcement measures are a major prerequisite. It is important that training for enforcers be implemented.



- Development of legislation. Adequate legislation creates sound basis for effective sanitation and water supply services. It should define the rights and responsibilities of users and service providers.

Public awareness

- Education measures. Information centres on clean technologies should be established. The objectives of these centres will be to raise the public awareness on the dangers of pollution and benefits of the implementation of measures to combat it, to disseminate knowledge on clean technologies and to facilitate the installation of new clean technologies.

4.4.2 Barriers to implementation

Major barrier to successful implementation of this strategy will be the high cost of some of the actions proposed such as the installation of wastewater treatment facilities. Other barrier is mainly the institutional one, because many countries lack adequate institutions that could carry out the necessary reform of the sanitation sector, including the introduction of economic instruments, preparation and adoption of legislative measures, and regulation and enforcement of the sector.

The immediate actions that are needed for the implementation of this strategy are:

- Bring in the international financing institutions to help less developed countries in the construction of adequate wastewater treatment facilities. The measures could include grants, technical support, soft loans etc.
- Start immediately the reform of the sanitation sector and make the programme of action for the introduction of economic instruments, including an analysis what instrument are the most appropriate to the conditions prevailing in each country.

4.5 Strategic option: Improvement of water supply efficiency

Many areas in the sub-region suffer from the intermittent water supply, in spite of the abundant water resources. Water losses in the region range from 20 to 70%. This issue has more to do with how available water resources are being utilised, than whether there is enough water. Demand management measures resulting in reduction of demand for water, as well as measures aimed at improvement of the efficiency of water distribution network, could result in better water supply efficiency.

The respective strategy would be crucial for reducing water demand. It doesn't necessarily have to include construction of new water supply systems, but could rather be based on better technical maintenance of water supply systems; more adequate pricing of water services bringing in more financial resources for maintenance; preparation, adoption and enforcement of the appropriate water use regulations; education; public awareness raising; stakeholders participation in management; and rationalisation of water supply networks.

The implementation of this strategic option could bring steadier water supply to large portion of the population, particularly in coastal urban and tourist areas, more rational use and less pressure on water resources, more economic use of water resources, reduced losses of water and positively modified water demand.

4.5.1 Actions

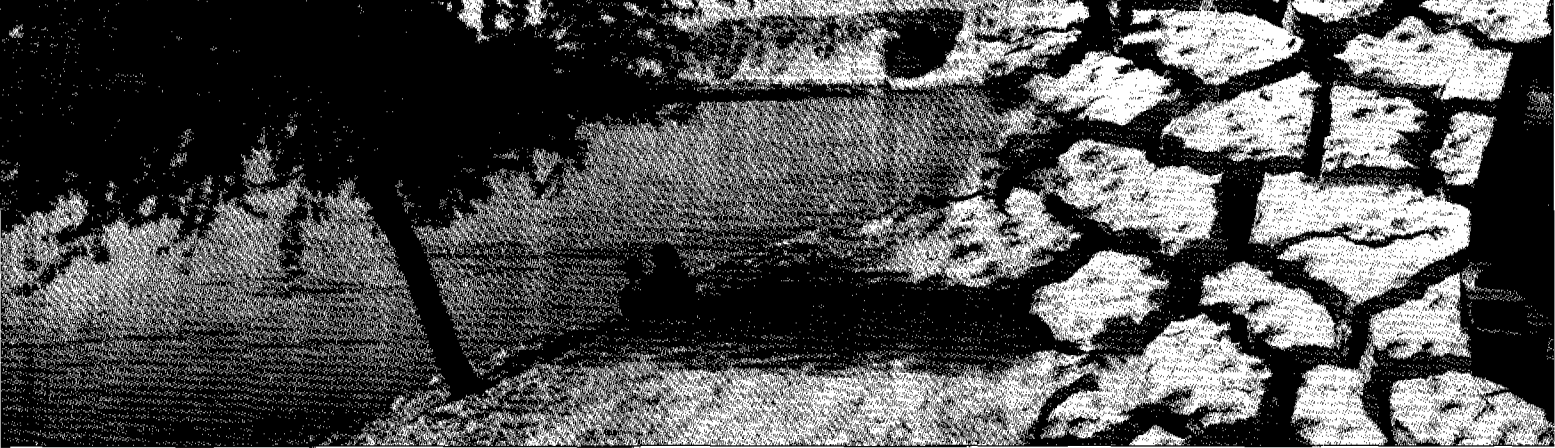
The following measures could be considered:

Technical

- Reduction of water losses. This is one of the biggest problems in most countries of the sub-region. Water losses range from 20 to 70% (such a high losses exist even in

Summary of actions to improve freshwater and coastal water quality and ecosystems' health

- Reduction of pollutants' generation
- Preparation of comprehensive pollution prevention plans
- Treatment of municipal and industrial wastewater
- Limited use of agrochemicals
- Preparation of contingency plans
- Pricing for sanitation services
- Introduction of tradable discharge permits
- Regulation of water quality
- Development of legislation
- Public awareness raising



Summary of actions to improve water supply efficiency

- Reduction of water losses
- Efficient re-use of treated domestic effluent
- Aquifer recharge
- Water saving incentives
- Capacity building
- Education

a developed country as Italy). In Albania, for example, situation is so critical that, in spite of the fact that almost all urban households are equipped with running water, and plenty of water resources, the shortages are frequent. Measures would include upgrading, modernising or replacing the old distribution systems, and the provision of accurate water measuring meters. Priority should be given to rehabilitation and modernisation of the distribution systems, and not to the development of new water resources and systems.

- *Efficient re-use of treated domestic effluent.* This action has already been mentioned earlier, but could be used in this context too. By using the lower quality water for uses where high quality water is not required, such as irrigation, street cleaning, gardening, etc. more water could be saved for domestic and other purposes where high quality water is needed. This action also has some economic advantages.
- *Aquifer recharge.* River water or treated wastewater could be used for aquifer recharge. Such water could be used for irrigation purposes. This action could be implemented in order to contain negative effects of droughts. There is a risk of pollution if treated wastewater is not of the quality required. Also, if financial resources to construct treatment plants would not be sufficient, then there will be not enough quantities of this water for aquifer recharge.

Economic

- *Water saving incentives.* It is necessary to discourage wasteful use of water either for domestic, industrial or irrigation purposes. Incentives might include pricing the drinking water to the level, which will allow full cost recovery, or increasing the cost of water used for irrigation that will cause reduction in the use of water. Privatisation of the water distribution systems in some countries has resulted in water savings, because the cost of water has gone up prompting, thus, consumers to rationalise their consumption. In case of privatisation, regulatory bodies are needed to avoid monopolistic behaviour of utility companies. Water saved by the implementation of above measures allows that all consumers have enough quantities of water, and safe supply of water for their normal uses.

Public awareness

- *Capacity building.* Training for the skills aimed at achieving better operation of water systems, particularly related to the technical skills for efficient management of water distribution systems, including how to reduce the excessive water leakage.
- *Education.* Action includes all forms of education and public awareness raising measures on water saving including school curricula, newspapers, information campaigns, education of tourists, television, radio, etc. Environmental NGOs could help in implementing this action.

4.5.2 Barriers to implementation

Lack of institutional arrangements and lack of financial resources could be the main barriers to the effective implementation of this strategic option. Also, there may be some resistance of the local authorities, which may want to give preference to the construction of new systems, particularly if this would be financed through soft loans, where the payment is not imminent. There have been cases in the sub-region when the local authorities opposed the water distribution system rationalisation plans proposed by an international development bank. Some proposed measures might require developed system of water management (like aquifer recharge), which may not exist in some countries of the sub-region. And finally, the change of perception on water from being a public good that should be accessible to anyone at no or at a marginal cost, to the good that has a certain (market) price, may create strong opposition in some of the countries of the sub-region. In order to void these barriers the following could be the short-term measures:

- Develop public awareness programs, which will show the population the benefits of a more rational use of water particularly showing how it could bring a more secure water supply.
- Restructure the water management institutional arrangements in order to facilitate the implementation of the proposed actions.



4.6 Strategic option: Mitigation of natural disasters' risk

The sub-region is confronted with two contrasting types of natural disasters: occasional droughts and floods. Droughts are mainly occurring in coastal areas of the sub-region, but also in hinterland areas of some countries, such as southern Spain and southern Italy. Droughts result in water shortages, and they are caused by the climatic extremes, but their impacts are aggravated by inadequate water use practices. Due to large and sudden influxes of water and thanks to the geography (typical situation is the narrow coastal strip with high mountain ridge behind, interspersed with stream or river valleys), floods are frequent phenomenon (France, Northern Italy, Northern Croatia, Albania). This strategy has to provide for short-term solutions aimed at the mitigation and prevention of damages from the floods, as well as to create the basis for preparation of long-term plans to reduce negative effects of the droughts. The latter is getting more and more important since droughts are likely to spread and increase in the coming years.

Water shortages due to excessive droughts are likely to increase and to become more frequent in some areas of the sub-region. Water shortages in the sub-region are mainly the result of one or more of the following factors: high demand for water (increasing population, increasing standard of living, tourism consumption); insufficient capacity of water resources; and changed environment (pollution, devastation of water resources, changed hydrological conditions, soil erosion). Floods are frequent phenomenon in the northern Italy and the Balkans. In the south they are rarer but of a greater intensity. Floods could have impacts with serious negative consequences on water resources, such as: soil erosion, pollution transport, changes of ecosystem characteristics, etc. Both phenomena could be altered by the expected climatic changes. The strategy could bring the reduction of damages from floods, increased water supply security in case when the drought mitigation plans will be implemented, improved food security, and reduced pressure on water resources.

The strategic framework will consist of a number of actions that could be implemented as full packages in the form of one or more of the above-mentioned strategic options, or as individual actions. For each concrete country or individual site, an action plan will have to be prepared, while the implementation of each action plan will depend upon national or local conditions.

4.6.1 Actions

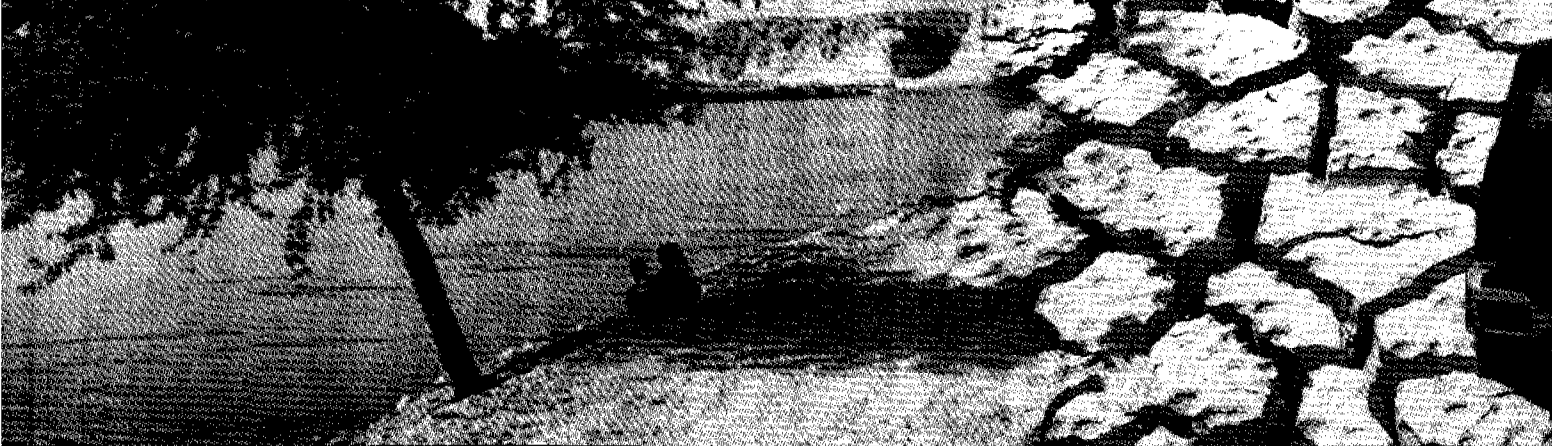
The following actions are proposed:

Drought management

- Preparation of drought preparedness plans. Plans should provide measures to cope with unusual draughts. They would include provisions for the following: forecasting, mitigation, relief, recovery and post-drought measures. Resulting policies include: disaster relief, control of natural events and reduction of damage potential. Response to drought has to incorporate measures in the following management framework: water supply augmentation (existing, new and mixed sources), demand reduction (proactive and reactive measures, technological adjustments) and impact minimisation (anticipatory measures, absorption of loss, loss reduction and change). Drought management plans have to be accompanied by adequate legislation, institutional arrangement and capacity building.

Flood management

- Forecasting floods. Measures include processing of data on rainfall and state of water, that allows prediction of water levels downstream, and flood-warning system installed on dams upstream.
- Controlling discharges. Measures include use of structures for controlled flooding and enhancement of river discharge capacity. Measures allow for achieving the optimum water level throughout the whole river system.



Summary of actions aimed at mitigation of natural disasters' risk

- Preparation of drought preparedness plans
- Forecasting floods
- Controlling discharges
- Construction of protective structures
- Physical planning
- Preparation of comprehensive flood management plans

- Construction of protective structures. Includes construction of flood control structures, dams, embankments, channels, pumping stations, etc.
- Physical planning. Adoption of land-use practices which include an effective control of human occupation of flood prone lands. Enforcement of regulations encouraging land uses such as recreation, and restricting non-compatible ones such as urbanisation, industry, etc.
- Preparation of comprehensive flood management plans. All the above measures should be integrated in a plan for a long-term mitigation of the risk. The management framework would take in consideration the following: modification of floods (weather modification, land treatment, river control), modification of susceptibility to damages (land use management, flood proofing of buildings, community preparedness), and modification of the flood losses burden (insurance, tax deduction, loans, relief funds, feeding and sheltering victims, rehabilitation services).

4.6.2 Barriers to implementation

There are four major barriers to the implementation of this strategy: (1) inadequate institutional and technical capacities to carry out the proposed actions, since most of them require high level of knowledge and experience; (2) inadequate political will to embark on the process of disaster prevention and preparedness, particularly when areas were not struck with major disasters in the past, and when it becomes difficult to gather an adequate support; (3) difficult integration and joint actions of local authorities when they require a transboundary approach; and (4) the high cost of the implementation of some of the proposed actions.

Public awareness programme and a more active role of stakeholders, such as NGOs, could help in creating a situation when local authorities will be forced to take a more active position towards mitigation of natural disasters and undertake preparatory activities to reduce the risk.

The Global Water Partnership – Mediterranean (GWP-Med)

The Global Water Partnership–Mediterranean (GWP-Med) is a Regional Water Partnership of the Global Water Partnership (GWP). The GWP-Med is an open platform bringing together competent organisations from all over the Mediterranean to promote and exchange knowledge on IWRM for the sustainable development of the region's water resources.

The main organs of GWP-Med are the: Membership Platform, the Partnership Council and the Advisory Board. The present members of the Partnership Council are: Blue Plan (MAP/UNEP), CEDARE, CIHEAM, IME, MedWet, MIO-ECSDE and MWN.

To achieve its goal, GWP-Med :

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



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