



**THE MEDITERRANEAN REGION
WILL UNDERGO
A FRESH WATER CRISIS!**

If nothing changes, most of the Mediterranean countries will encounter, in less than a generation, serious problems in managing inland freshwater, the availability of which, in sufficient quantity and quality, may become, as it is already the case in several of them, a main challenge for economic and social development.

Wastage and pollution will then be such that « water stress » will affect, in a way or another, most of the populations of the basin and the poorest first of all.

The effects of global warming will increase current trends!

In the Mediterranean climate, rains may be heavy, concentrated over a few weeks per year, and sometimes cause fatal and devastating floods, the flow of which cannot be stored and turns over to the ocean, and then are followed by long months of drought.

In the Mediterranean basin, freshwater is already very irregularly distributed between the countries and prone to very high seasonal irregularities and great interannual fluctuations: 2/3 of the resources are concentrated on 1/5 of the basin, thus, France, Italy, Turkey, and ex-Yugoslavia cumulate more than two thirds of the basin water resources. In Spain, 81% of the resources are located in the Northern half of the country; in Morocco, the two main basins, Oumer-Rbia and Sebou, which cover a tenth of the territory, provide 50% of the flows; in Tunisia, the Northern part (30% of the territory) produces 80% of the resources; in Algeria, 75% of the renewable resources are concentrated on 6% of the territory.

The irregularity of the surface water regime requires much effort for control by way of regulating infrastructures, but the easiest and least expensive ones are already built in most cases.

The high concentrations of sediments in flood water make the silting of reservoirs very active, and their regulating function is thus reduced. The losses in live storage of the reservoirs are usually 0.5 to 1% per year, sometimes more, some of them are already half filled up.

Suitable sites for dam-reservoirs being in a limited number, their complete equipment and then their filling up are foreseeable in the 21st century. The prevention efforts (afforestation of the river basins, silting tanks) may delay their end: an inescapable decrease in controllable water resources by regulation will result from it.

As regards the exploitation of nonrenewable resources offered by large trapped fossil aquifers in the South, which are sometimes transboundary, its necessarily limited duration is function of the abstraction volume, as in any mining; it could last about fifty years in the best case. In Jordan, for example, the possible exploitation of nonrenewable resources is estimated at 143 million m³/year during 50 years; it should thus stop around 2040.

Moreover, the quality of abstracted water can be degraded by its mixing with salted water even before the fossil reserves become exhausted, further shortening the duration of their exploitation.

In the Mediterranean, beside countries with completely (or almost) internal resources (Spain, Italy, Turkey, Lebanon and Morocco), others depend, in a large part, on their neighbors: Egypt with 98%, Syria with 80%, Israel with 55%, ex-Yugoslavia with 45%.

To the contrary, some upstream countries are suppliers and must reserve a large share of their resources for their neighbors (Spain, Turkey, Syria, ex-Yugoslavia).

However, it is quite clear that water has no boundary, and that the only scale for its consistent management is the river basin or the aquifer, whether national or transboundary. The main shared resources of the area encounter significant geopolitical problems, the Jordan, Tigris and Euphrates, Nile rivers, the Sahara, Golan, Nubian aquifers, etc.

In several countries, the needs already exceed the yearly renewable resources and the prospective studies, those of the Blue Plan in particular, show that, without substantial changes in current practices, critical situations will appear in the first half of this century.

The dynamics of the populations is the prevailing factor of the economic, social and environmental evolution of the Mediterranean region. According to the United Nations scenarios, the total population of the area would increase from 426.3 million inhabitants to a figure ranging between 515 and 605 million in 2025. The demographic growth in the South and East of the Mediterranean is estimated at +31% from now on to 2025, as compared to + 2 to 3% for the EU.

As compared to the populations of the Mediterranean basin, the water resources per capita are revealing the countries' levels of water richness or scarcity. They go from extreme scarcity (less than 100 m³/year in Gaza and Malta) to superabundance (more than 10,000 m³/year in Albania and ex-Yugoslavia).

Eleven countries (Malta, Cyprus, Syria, Israel, the Palestinian Territories, Egypt, Libya, Tunisia, Algeria, Morocco, Jordan), whose total population is more than 115 million inhabitants, are already below the average threshold of 1,000 m³/year and per capita, a situation in which tensions appear between needs and resources, especially when irrigation is necessary. In seven of these countries, the resources are now under the "scarcity threshold" of 500 m³/year per capita: Algeria, Israel, Jordan, Libya, Malta, the Palestinian Territories and Tunisia. In these countries moreover, about all the renewable natural resources are already exploited, even overexploited.

In Jordan, freshwater availability, which was 3,600 m³/inhab./year in 1946, was just 145 m³/inhab./year in 2004, as a consequence of demographic growth!

The population of the countries with water scarcity (having less than 1,000 m³/year per capita) of the South and East of the Mediterranean could reach more than 165 million in 2025, including 63 million under the scarcity threshold of 500 m³/inhab./year.

It is generally admitted that the **final consumption indexes**, equal to or higher than 25% of the water abstraction as compared to rainfall, are revealing local and economic tensions. Above 50%, they announce more frequent and more regional economic tensions. When approaching 100%; and a fortiori above, they indicate generalized structural shortages: From 2010 onwards, these indexes would be higher than 50% in eight countries, in a low case, and eleven countries, in a high case. In 2025, ten countries will be in this situation, in a low case, and thirteen, in a high case.

In a high case, they would exceed 100% in seven countries in 2025, meaning either huge water re-use or using nonrenewable resources or non-conventional resources. Thus, in Libya, where the demand is covered by more than 90% with fossil water; in Israel, Jordan and in Gaza, the significance of indexes should be attenuated by increasingly re-using treated wastewater

It is obvious that among the countries most threatened by water shortage, Libya, the Palestinian Territories-Gaza, Jordan, Israel, Malta are first and are followed by Syria, Cyprus, Tunisia and Algeria.

Global warming, which is now proven, could lead to an increase in extreme phenomena: floods and droughts. Models foresee a reduction by 25% of summer rainfall in the Mediterranean basin, as well as significant changes in the ecosystems. The area could encounter a temperature increase twice higher than Northern Europe.

In the Northern countries of the basin, the melting of the glaciers and the reduction in winter snow cover may change the flow regime from the mountains, which then would no more play their role of «water towers», as they do today.

It is advisable to update the resource assessments which were carried out without taking climate change into account and it is necessary to anticipate the evolutions at 30 years in the definition of regional planning and investment plans.

Needs increase very quickly for irrigation, urban and industrial consumption in particular, and the demand could further increase by a quarter in volume up to 2025.

Agriculture represents about 70% of water consumption and its demand continues to grow. FAO estimates that irrigated lands could increase by about 48% up to 2030 in the South and East of the Mediterranean and remain stable in the North.

Because of the vital character of human water supply, the urban demand will quickly prevail in the allocation of investments and resources. In the South and Eastern Mediterranean countries, the urbanization rate has usually exceeded 50% of the total population; it increases very quickly to reach, in twenty or thirty years, the “ceiling” value of 70 to 80% that the Northern countries will reach soon.

In a generation, the urban population will have increased four times, exceeding 130 million inhabitants, in the East and the Southern countries.

In addition, with 250 million national and international tourists per year, the Mediterranean area is the first tourist destination worldwide. Tourism causes demand for drinking water to increase in host cities: 500 to 800 l/day/capita for stays in luxury hotels, i.e. a lot more than the permanent inhabitants. Golf courses consume as much water to the hectare as the well irrigated areas (10,000 m³/ha/year).

The problem of water distribution between irrigation, tourist areas and big cities is now arising in many places.

While remaining minor, industrial water consumption will also grow. It is the case, for example, of the Algerian large paper mills which are big consumers (one of them alone withdraws 30 million m³/year, the equivalent of a town with half a million inhabitants); some areas have large projects for industrial development.

Although efforts have been made, the water share reserved for ecosystems remains too limited for their good functioning.

Wastages are inadmissible: The proposed figures highlight losses through evaporation and infiltration of about 70% in traditional irrigation.

Various traditional or modern irrigation techniques coexist; much varied water demands per hectare result from it (from 2,000 to 20,000 m³/year).

Modern techniques, reducing irrigation water, are developing unequally in the countries. Very widespread in Israel, in Cyprus, in Jordan, they are less used in Morocco (16% of irrigated areas), in Tunisia (11%), in Syria (only 1%), in Egypt (27%).

In the cities, the rate of water losses in the drinking water supply systems is estimated at 50%.

The efficiency of the dam-reservoirs is reduced by the high evaporation rate which affects the water levels. In Algeria, for example, water evaporates from 1.3 to 2.2 m/year. In Egypt, the average loss is 10 billion m³/year for Aswan, i.e. 12% of the Nile flow rate.

It is quite clear that before trying to use new resources, priority is given to the optimal use of current resources.

A significant increase is also observed in the pollution of surface and ground water: In many Countries, the qualitative approach to the resource is only tentative, even non-existent.

In 2004, 47 million Mediterranean peoples had no sanitation system.

The last UNDP report estimates that 85% of the pollution caused by human activities is discharged into the natural environments without any treatment.

However, with development and concentration of populations, **the discharged pollution** (industrial pollution of course, but also urban and almost everywhere agricultural) **generates, at least locally, dangerous situations for hygiene and human health and prevents the successive re-use of the resource from upstream to downstream and from the aquifers.**

The economic systems of cost recovery are not yet widely used: In most countries of the South and East of the basin, **huge cultural and even religious reservations are opposing to an industrial and commercial approach to water management.**

However, the investments to be made in the next decades and the operating and maintenance costs of the infrastructures are considerable and will not be, in most cases, covered by the traditional national or local public budgets.

In addition, the management of services has been too often neglected to the benefit of the building of infrastructures, whereas it should be remembered that, over the infrastructure lifespan, operating expenses are at least of the same order, even superior to the investment expenses. All the international institutions now agree that **there is no other solution to the water problem than the direct financial participation of the users.**

If, more and more, there are enough project engineers, the managers and operators are usually still too few.

The basic training of the technicians and administrative staff remains tentative and more theoretical than really practical, **that of the farmers and irrigators is to be developed.**

Continuing professional training is to be organized.

It is thus necessary to quickly find solutions to the problems, which arise or are likely to arise in the short term, to ensure integrated and sustainable water management, allowing both protection against the natural flood, drought and erosion hazards, and the meeting of the rational and legitimate needs of the various categories of users, in consistency with suitable basin development, the sustainable conservation of water resources and related ecosystems.

It should be done fast because it is now urgent and that the possible solutions will only take effect in the medium and long terms. It is thus necessary to start now reforms, sometimes drastic, needed on a large scale and to continue them with obstinacy.

The encountered difficulties are practically never technical, even if adaptations are still necessary for rural areas and underprivileged urban districts.

The main problems are related to (i) insufficient knowledge of the resources, ecosystems and their uses, as well as water saving, (ii) a bad organization of the institutions and financial channels at all levels, either local, national or international, (iii) the lack of an overall and long-term vision of the resources and uses, (iv) insufficient users' common cause, (v) a lack of financial resources and mechanisms allowing their mobilization, (vi) a huge delay in education and professional training.

Priority should be given to fighting against wastages, improving the effectiveness of water use and to preventing permanent or accidental pollution: sound management would allow saving, in 2025, 24% of the foreseen demand, thus avoiding the building of almost 100 dams. It is thus necessary to imperatively, and first of all, use less water for the same result, either in irrigation, in industry or in the cities.

The two main approaches currently promoted are the creation of alternative resources by re-using treated wastewater for specific uses (industry or some types of irrigated crops) and the massive use of sea water desalination (Algeria, Spain, Malta, Cyprus and Israel).

Sea water desalination is a solution only for supplying drinking water to cities and coastal tourist zones. It is not a solution for irrigation which requires too much raw water and thus would not be able to pay such a high price for producing the freshwater it requires, even if some countries, which have a lot of energy resources, can afford this luxury for small surfaces!

The real problem is not so much to mobilize new resources but to rationalize uses!

It is now necessary to have a new approach, which will privilege the rationalization of the demand and thorough thinking on the regional planning which will take into account water as a limiting factor for some types of development.

Statistical source: Blue Plan (2005).

A Sustainable Future for the Mediterranean: The Blue Plan's Environment and Development Outlook,

Edited by Guillaume Benoît and Aline Comeau. Earthscan, London.