



MEDITERRANEAN ACTION PLAN

**MEDITERRANEAN COMMISSION
FOR SUSTAINABLE DEVELOPPEMENT**



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Water demand management
Fréjus, 12-13 September 1997**

Summary Report

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FOREWORD

The problem of water resources is at the heart of the common concerns of Mediterranean countries today.

When one considers that water demand in the region overall has grown by 60 per cent over the past quarter of a century and that, at the predicted level of population growth, by the year 2025 practically no southern Mediterranean country will have resources exceeding an average of 500 m³ per capita/per annum, equivalent to the population's essential needs, it can be seen that the problem will become increasingly acute.

These concerns have been widely voiced by the most authoritative sources both at the national and regional levels, notably through the appropriate Mediterranean structures.

Chapter XVIII of Agenda MED 21, the Mediterranean translation of Agenda 21 adopted by the UNCED, emphasizes *inter alia* that in all Mediterranean Basin countries there should be prospective studies "to anticipate medium and long term developments in countries already facing sharp water shortages and recommend solutions likely to reduce their effects".

MAP Phase II, by broadening its objectives within the framework of the revised Barcelona Convention adopted in 1995, included among its priorities the management of sustainable use of water resources.

The creation of the Mediterranean Commission on Sustainable Development (MCSD) in 1996 underlined the political determination of the region's governments, the European Union, and various public and private partners, to develop regional and sub-regional cooperation. These actors are deemed to be the most appropriate for promoting the incorporation of environmental concerns in development policies.

Water management becomes the core of sustainable development when water extraction reaches approximately the same level as resources so the MCSD rightly included the question of **water demand management** as one of its short-term priorities for 1997.

Tunisia and Morocco, as task managers, benefited from the assistance of the members of the working group, namely, Cyprus, Egypt, the European Community, Libyan Arab Jamahiriya, France, Israel, Italy, Malta, Spain, WWF, CEFIC, MIO-ESCDE, APNEK, and CEDARE.

The Blue Plan, one of MAP's Regional Activity Centres, provided scientific and logistic support. Together with the task managers, this support took the form of:

- preparation of the preliminary report submitted in February 1997;
- preparation of the progress report (UNEP(OCA)/MED WG.124/Inf.6) submitted to the second meeting of the MCSD, held in Palma de Mallorca in May 1997;
- organization of the workshop on "Water demand management", held in Fréjus on 12 and 13 September 1997, with the support of the Provence-Alpes-Cote d'Azur region, the town of Fréjus, and the Split Regional Activity Centre/Priority Actions Programme.

The purpose of this report is to assess the results, the prospects and the conclusions arising from the Fréjus workshop. The conclusions are proposals for action aimed at those responsible for national and international water policies, managers, economic actors and users. They are submitted to the 3rd meeting of the MCSD to be held at Sophia Antipolis from 28 to 30 October 1997.

INTRODUCTION

OBJECTIVES OF THE WORKSHOP

Experts and officials from 16 countries and 14 intergovernmental or non-governmental organizations, private firms and local authorities helped to meet the objectives of the workshop, which were the following:

- 1) **to specify the characteristics of water use systems: the strong points and the malfunctioning or inconsistencies inherent in the systems adopted;**
- 2) **to identify the socio-economic, institutional, legal and technical obstacles that hinder or prevent sustainable management of demand and their respective importance;**
- 3) **to make a precise assessment of the water conservation that could be achieved, to estimate the efficiency and cost in terms of technical and economic feasibility;**
- 4) **to identify the socio-cultural, economic, institutional, legal and technical measures to be taken to remedy the defects and eliminate the obstacles so as to prevent shortages in the future.**

The workshop provided an opportunity for in-depth discussion of the relative importance of the various defects of water use systems and the effectiveness of the tools used to remedy them. It also enabled some relevant guidelines for “sustainable” management of water demand to be outlined. The workshop represents a continuation of the work carried out at the IME seminar at Chateau d’Avignon on water demand management in Mediterranean countries (3-5 December 1992) and the expert workshops at the Euro-Mediterranean Conference in Marseille (26-28 November 1996). The conclusions of these two meetings were circulated to participants.

The overall objective of the workshop is control of demand within the broader strategic objective of sustainable water management in the Mediterranean.

CONDUCT OF THE WORKSHOP

The following working documents prepared for the purpose of guiding the debate at the workshop :

- 1) **Framework document to direct the workshop’s discussions, to which are annexed the information sheets for the three working groups.**
- 2) **Issues of water demand management in Mediterranean countries. This introductory study reiterates the objectives, methods, means and tools of demand management, as well as approaches to assessing the feasibility of the water conservation predicted.**
- 3) **Synthesis of country information sheets. This represents an effort to improve, harmonize and update information on water use in Mediterranean countries.**
- 4) **Compendium “major facts and figures relating to water demand in the Mediterranean”, which completes the summary by showing the most important figures available.**

At the instigation of the MCS D task manager, a request for detailed information was sent to all participants for the purposing of assessing the status of water use systems in Mediterranean countries as a whole. The summary document circulated during the workshop took into account replies from ten

countries (Albania, Croatia, Egypt, Italy, Libyan Arab Jamahiriya, Malta, Morocco, Slovenia, Tunisia, and Turkey), the general documents sent by the European Commission and the region of Catalonia. It will be completed by the replies received during the workshop (Bosnia and Herzegovina, Cyprus and Israel) and by documents provided by the countries previously mentioned. Comments and information sheets from countries that have not yet replied (Algeria, France, Greece, Spain, and Syrian Arab Republic) are awaited.

Following a general discussion of the objectives and problems of water demand management, three working groups considered ways and means of managing demand in the major sectors of use, evaluating their scope and adaptation, their lacunae and the focus for efforts:

- 1) Working group 1 on socio-economic tools;**
- 2) Working group 2 on institutional and legal tools;**
- 3) Working group 3 on technical tools.**

Each group, composed of around 15 participants, concentrated on one aspect of demand management, basing itself on a special guiding sheet and a summary table showing the management tools and the defects to be remedied in each use sector use (Table 1 annexed). The different national and local experience of demand management tools was considered.

The main points of the discussion, together with the recommendations by participants on water demand management, are shown below.

SYNTHESIS OF DISCUSSIONS

ISSUES OF WATER DEMAND MANAGEMENT

The attenuation or adaptation of water demand can to a large extent compete with increased supply (enhancement of traditional water resource facilities - the dominant trend in the past - or the development of non-traditional water resources) so that supply meets demand. Concrete awareness of this fact makes water demand management a very topical issue. It would be helpful to summarize briefly the objectives, methods and means of water demand management.

OBJECTIVES

Water demand management has three goals: (1) to conserve resources that are rare and/or costly to produce; (2) to minimize the cost and effort of providing water; (3) to limit disputes over use; and (4) to make the best use of water.

Water demand management thus seeks both to reduce “non-use” of water extracted or produced and “misuse”, in other words, material and/or economic wastage under both aspects. These comprise: practical defects in use systems (loss, leaks, lack of efficiency), unnecessary or superfluous use, excessive use of high-quality water when a lower quality would suffice, badly chosen use and reuse, defects downstream of use. It is necessary simultaneously:

- to reduce demand or at least slow down its increase;
- to harmonize demand and supply possibilities as far as possible;
- to coordinate and maximize multiple uses of limited water resources;
- to alter the factors governing water requirements and adapt the sectoral structure of water use, promoting the most effective.

WAYS OF MANAGEMENT

Action must be on three levels if these objectives are to be achieved:

- water conservation, which is the responsibility of agents, distributors and users;
- organization of collective water use, promoting in particular sequential use (reuse);
- allocation of resources among sectors of demand according to socio-economic and political criteria.

These methods and the management actors are of course specific to each use sector (supply of drinking water to the local community, water for industry, irrigation, cooling of thermal power stations).

MEANS AND INSTRUMENTS OF MANAGEMENT

Water demand management utilizes means that differ according to the type of defect to be remedied. Certain means, particularly those of a technical nature, are direct water conservation factors; other facilitate and govern indirectly the application of the former and affect the behaviour of the users (economic and financial, socio-cultural, legal and regulatory tools). These instruments are effective only if used in synergy.

Although they all have the same purpose, demand management strategies will continue to vary greatly according to the situation and the future developments foreseen in each country. The choice of priority solutions and the “orchestration” of the different management tools will depend to a large extent on the major types of defect, the competing supply/demand levels, and the socio-economic means and situation in each country.

The choice will depend on the one hand on the capacity to catalogue and evaluate the water use defects that must be remedied and, on the other, to identify the appropriate ways and means in general. The feasibility of each operation has to be examined, case by case, in order to be able to assess the gains (lower demand) expected and the corresponding direct or indirect cost, and then to compare these with the cost of producing additional water in order to meet the corresponding growth in demand in the future (according to demand expectations).

SYNTHESIS : ASSESSMENT AND PROSPECTS

This assessment is based on the information available today, including the data provided on the information sheets sent in by experts in a number of countries for the purpose of preparing the workshop. The information has been completed by recent documents at the national level. This summary of the situation is nevertheless still marked to a certain degree by lacunae and imprecision.

The study covers 21 countries and areas bordering the Mediterranean. These have been divided up into four groups where the situation is relatively similar in relation to the risk of shortages threatening them and future and present water demand:

- 1) **Group 1: countries where there is no risk of shortages even beyond the year 2025 (Albania, Bosnia and Herzegovina, Croatia, France, Greece, Italy, Monaco, Slovenia, and Turkey);**
- 2) **Group 2: countries where there is an occasional more or less local risk of shortages (Cyprus, Lebanon, Morocco, Spain, Syrian Arab Republic);**
- 3) **Group 3: countries where there will be occasional or structural shortages from the year 2000 despite low demand for water (Algeria, Israel, Malta, Palestinian territories, Tunisia);**
- 4) **Group 4: countries where there will be structural shortages from the year 2000, exacerbated by high demand for water (Egypt, Libyan Arab Jamahiriya).**

A number of main general conclusions can be drawn from the analyses of the situation in each group of countries..

WATER USE SYSTEMS ARE FAR FROM PERFECT

At a time when water demand and the pressure on resources are increasing, and it is becoming more and more expensive to mobilize these resources, a large part of the water extracted appears to be badly or little used in most Mediterranean countries. Even if there are shortages, the efficiency of use is far from satisfactory in the drinking water and irrigation sectors.

- At least one third of the volume of water produced and distributed as drinking water in towns and villages leaks out through the network or is wasted by misuse (washing cars or watering gardens with drinking water). This helps to expand the volume of wastewater that goes into the sewers and increases the cost of treating it. Billions of dollars are thus wasted each year on producing and supplying water that is not used;
- Almost one half of the volume of water supplied for irrigation through systems that are costly for the local community is not actually used in the fields. This is due to leakage during its transport, badly adjusted modes of supply to the fields, low efficiency of the irrigation systems, and excessively consumer-oriented crops;
- Many industries use volumes of water that far exceed their needs, lowering its quality. Here again there are defects in recycling, leakage and loss, and inefficient production processes.

The volume of water lost or wasted is an extraordinary unexploited « waterfield ».

AN UNEXPLOITED "WATERFIELD"

Water conservation efforts show decreasing profitability and increasing costs. It must therefore be estimated exactly how much of the water not used could be saved and how much this would cost. Blue Plan tried to estimate the gains to be expected on the basis of plausible hypotheses on limiting losses in production and distribution systems, reducing wastage among users, modifying exploitation systems, especially in agriculture, and changing traditional practices.

Overall, for the majority of Mediterranean countries, a preliminary estimate of the amount of water that could be saved by more rational management of use and lower demand shows a significant volume (75.5 km³/year) compared with the additional water to be supplied to cover growth in demand trends forecast for the next twenty to thirty years (+ 85 km³/year for the year 2010 on a pessimistic hypothesis, and + 148 km³ in 2025).

- in order of importance, the most beneficial savings in terms of volume would be in the irrigation sector : reduced losses during transport together with greater efficiency (71 per cent of the total, more than half of which due to improved efficiency). These savings would be greatest in group 4 (85 per cent) because of the importance of Egypt, but less in the northern countries in group 1 (58 per cent);
- next comes better recycling by industry (18 per cent), 73 per cent of these gains being in the North (group 1), where they account for almost 30 per cent of the total;
- then would come reduction of loss, leakage and wastage of drinking water in local communities (10 per cent), although these would be of greater value in view of the higher cost of producing and distributing drinking water. They take second place in groups 2 and 3, where they represent 9 per cent and 25 per cent of the total to be saved respectively.

These figures are only indicative. Quantifying the potential gains according to sector would have to be the subject of feasibility studies to be carried out in each country in the light of its socio-economic and political situation.

In this study, the objective is gradually to bring demand into line with requirements when the former exceeds the latter, assuming that these requirements are justified and cannot be reduced, and that they do not depend on factors alien to the water economy (population, living standards, etc.).

From this assessment, the three working groups tried to study the nature and efficiency of means to be implemented for a better water demand control according to the drawback to be corrected. The analyses and conclusions of these working groups are presented thereafter.

WORKING GROUP 1 : SOCIO-ECONOMIC MEANS OF WATER DEMAND MANAGEMENT

The Working group concentrated in particular on the means and instruments for management such as:

- Costs of intervention on demands (investment, operations)
- Pricing modalities
- Financial incentives (taxes, fees, subsidies)
- aspects related to communication : education, information, awareness

Applied to the major water use sectors taking into account the aspects of water reuse involving various sectors, and the possibility of choosing a water quality adapted to the use. The main ideas which emerged from the discussions are summed up as follows:

COST OF INTERVENTION ON DEMANDS

- Several slight differences were brought up on the definition of the costs. A consensus was adopted in order to assess these costs while taking into account investments and operation costs.
- Necessary costs in particular for rehabilitation and system modernisation operations have proved to be very cost-effective in order to improve the performance of drinking water and irrigation systems. A priority should be accorded to the regulation and the maintenance of transport where earnings are more tangible on the short and medium term.
- Adopting metering and the installation of measuring equipment for water systems (when this is possible) thus allowing to better understand the low efficiency points in water systems.
- Investment interventions merit to be carried out in the scope of a participative approach with users and following thorough social, technical or economic studies.
- In the industry field it seems that the global cost of water use (supplying, waste water treatment and energy) is vital in the choice of industrials in any investment operation. Respecting regulations could however form a first step in the incentive for water savings.

MODES OF PRICING

- The experience of several countries in the North and South of the Mediterranean allows us to conclude that water pricing forms at the current time one of the best instruments to moderate water consumption in the majority of use sectors (when the elasticity of demands to prices are not negligible).
- Pricing, when considered as an economic tool, should be adapted to the various uses, taking into account its social and political implications. The structure and level of tariffs make up two means for the better orientation of the tariff policy.
- However, moderation of demands should take a major part within the objectives of water demand management. It is to be conciliated with the other goals to be achieved, even if they seem sometimes incompatible : balancing charges, redistributing revenues, influencing general price indexes, making users conscious of managed costs, lead consumers in the general interest direction).
- Furthermore, the tariff systems needs to be adapted to the various uses and should take into account the political and social implications. In particular, the tarification with a high progressivity should be recommended.
- The setting up of a tariff should take into account all the yearly costs suitably accounted for as well as long term strategies concerning the future of water systems.
- Water tariffs are often the only link between the user and the management institution. The monitoring of tariffs and the assessment of their impact are highly recommended.
- Tariffs do not solve all problems. They are not a substitute to political choices. At best, it accompanies them.

FINANCIAL INCENTIVES

- Financial incentives, penalising (taxes and fees) or encouraging (grants) can be considered as

other consumption orientation tools. In order for them to be efficient, it is very important to make users see very directly the meaning behind and the aim of these incentives.

- In addition to the principle « polluter-payer » to be generalised in all catchment basins, the setting of a « waster-payer » principle could be imagined. In order to reduce waste, fees (to be defined according to the situations) could be used to finance incentives for efforts.

COMMUNICATION ASPECTS

- The education of the youth « water courses » is vital.
- Using references to « success stories » in Mediterranean countries as a message.
- Multiplying popularisation campaigns to be financed by public authorities and the developing of a council specialised in irrigation.
- Awareness of the private sector when it comes to the development of branches specialised in water savings which are financially balanced.

CONCLUSIONS ON THE SOCIO-ÉCONOMICAL INSTRUMENTS

A detailed assessment has been carried out by the group in view of identifying the various management tools mentioned above (see table 1). The following conclusions emerge:

- Costs of intervening are considered more efficient in the fight against distribution and transport losses in particular in the drinking water and irrigation sectors.
- Tariffs systems seems to be very efficient in reducing leaks of drinking water at homes and to fight against defects of efficiency in irrigation.
- Financial incentives are most interesting in the fight against recycling drawbacks and efficiency defects of industrial processes. The same goes for reducing transport losses in irrigation systems.
- Communication means proved to be very efficient in reducing leaks at the drinking water consumer level.

The experience of various Mediterranean countries in implementing these tools is very varied and rich in teachings. Several particular cases are worth being analysed and better known by everybody.

WORKING GROUP 2 : INSTITUTIONAL AND REGULATORY MEANS FOR WATER DEMANDS MANAGEMENT

The working group took into account 3 aspects of institutional management of demands:

- The instruments of legislation and regulation,
- The action of management institutions,
- The participation of users.

LÉGISLATIONS AND REGULATIONS

- The different groups of countries and the examples that have been cited enlightened the existence of legislation generally adapted and according to the local availability of water resource.
- These systems are well designed but their implementation is not satisfactory done. If these tools are to have a strong impact upon water demand management, it is recommended to implement or to reinforce a policy system on water, that would have the adequate human and financial means to guaranty the respect of the acts authorising the exploitation of water resource.
- The character of common good of water resources (which patrimonial value can not be denied) would therefore be recognised by the players.

INSTITUTIONS OF MANAGEMENT

- At the level of the institutions in charge of management, the need of consistency and coordination has been pointed out and should be generalised in the spirit of some counties where structures, (such as the national water council, are already in place under the presidency of a high ranked state official who could, therefore, coordinate the actions of management institutions).
- In order to ease the demand management at the level of these institutions, it is recommended to set up in each country a kind of water institute that would gather information and parameters necessary to the demand management and to good decision making by high authorities.
- Management institutions must have a strong concern about the meaning of the public service and the general interest as they provide water supply necessary to life and economic development. This preoccupation should be guaranteed even if it does not go in the direction of the short term self interest of the manager.
- The privatisation (delegated management) of the production-distribution units can improve the management of demand. However it has to be implemented wisely and in a very progressive way.

USERS PARTICIPATION

- Users finally are, as consumers, very much involved in the water demand. Very little jurisdiction is applied to them, except in the field of invoicing.
- water users associations- such as the tunisian irrigation associations- should be multiplied, as much in the irrigation and drinking water sectors.
- Stress has been put upon the risk of waste in the collective installations that have a unique meter (group of houses, building, etc...) which operates by allocating among unmotivated users and where the follow up of consumption is not done.

CONCLUSIONS ON THE INSTITUTIONAL AND REGULATORY INSTRUMENTS

A detailed analysis was done by the group in order to assess the efficiency of the different instruments discussed previously (see table 1). The following can be enlighten:

- legislative and regulatory tools are particularly effective in promoting sequential use by a

- number of sectors (reuse) and use of water whose quality is adapted to the use to which it is destined;
- these tools are backed up by action on the part of management bodies, which also take effective action to prevent wastage from drinking water distribution networks;
 - participation by domestic and industrial users and by the tourism sector is considered to be particularly effective in reducing leakage and misuse, and in improving efficiency.

WORKING GROUP 3 : TECHNICAL MEANS OF WATER DEMAND MANAGEMENT

The group has reviewed the technical aspects of all the whole water use process, such as :

- the necessary instruments to identify demands for assessing and monitoring of performance ;
- actions on conveyance loss,
- actions on process and efficiency of use and storage ;
- waste water treatment and water reuse (waste waters, drainage waters, etc.)

In particular, the reasons of discrepancies among the various Mediterranean countries, as well as the possible guidelines for future considerations have been considered and emphasised.

KNOWLEDGE OF DEMANDS (ASSESSMENT, PERFORMANCE MONITORING)

- The group has stressed the importance of quality aspects and pollution problems with regard to the assessment of water demand. The demand should be formulated taking in due account both the quality of the available resources and the quality requested by the user. This involves the development of technical tools able to identify and control the water quality. Such instruments ease the application of the « polluter-pays » principle through levies that are based upon the water volume consumed.
- An important contribution in assessing the water demand is the introduction of metering tools (for withdrawals, but also at the level of pumping stations for distribution and at the user's) in order to better control the quantity and quality aspects of usable water. Data relevant to water are scarce in many Mediterranean countries and cause severe drawbacks in the water resource policies.

ACTIONS ON EFFICIENCY OF CONVEYANCE

- Leakage and losses amount to up to 40-50% in some Mediterranean countries (for the urban and agricultural sectors). It is therefore necessary to introduce suitable devices for detecting, locating and repairing the leakage in conveying and delivering systems. In the field of prevention, real maintenance policies must also be reinforced.
- In several Mediterranean countries, high pressures in the delivering pipes are often the cause of abuse in consumption and leakage. An accurate research is necessary to point out suitable devices for adjusting the pressure, control and regulate the flow in most of the conveyance systems and for the users (industrial, domestic, and the irrigation sprinklers and drippers). This is essential to define a correct demand.

ACTIONS ON THE PROCESSES AND THE USES AND STORAGE EFFICIENCIES

- The procedures leading to the rational management of water rely mostly on mathematical models. Up to now, too many models are available with little success in their application because of their lack of reliability. There is, therefore, a challenge for engineering and systems science to develop reliable models capable of solving management problems. In fact, the optimisation of control and management systems contribute greatly to reducing losses and misuses by users.
- Maintenance, and repair the devices adopted for conveying, storing, treating and delivering water are an important part of water demand management.
- Water demand in agriculture is determined very often through empirical formulae. There is a urgent need for research to refine the usual formulations and introduce more suitable ones based on experiments. The precise identification of length, quantity and optimal feed for each irrigated crop should help to improve significantly the water economies.
- Delivering of water for agriculture is still a practice suffering from several drawbacks. There is a need for improved tools, to be adapted to specific local and agricultural systems

conditions. It is particularly important to favor the extension of modern irrigated systems that lead directly water to the rooting absorption systems (micro-sprinkler, and dripping)

- Introduction of crops species or varieties requiring small quantities of water is to be considered and enhanced. In this field, research in general and especially in the genetic field plays a major role.
- Water in households is often wasted because of deficient appliances or very consuming sanitary systems. There is a need to revise and improve such appliances.
- Industrial processes in some Mediterranean countries are almost obsolete and use not only high quality of water but also in quantities that are far higher that needed. One of the remedy to this problem could be the introduction of air cooling systems.

ACTIONS ON TREATMENT AND WATER REUSE

- Saline water (brackish and sea water) and reclaimed urban and industrial water can be useful to meet some demand not necessarily requiring high quality water. The use of such kinds of water can help to save better quality water for other purposes, primarily for drinking. Research and technology should provide tools for handling, conveying and treating this kind of water. The substitution of drinking water use by secondary water is an important area of water demand management.
- Recycling and subsequent use of water in industrial activities requires suitable treatment processes in order to restore the original quality of water. The processes are now poorly applied in the Mediterranean countries but they can help saving reasonable quantities of water.

CONCLUSIONS ON THE TECHNICAL ASPECTS

A detailed analysis was done by the group in order to assess the efficiency of the different instruments discussed previously. (see table 1). The following can be enlighten :

- technical tools have effective direct action on the corresponding technical defects.
- greater familiarisation with demand and its follow-up/evaluation in the various sectors reinforces the effectiveness of the other tools.

Possible technical strategies are closely linked to the overall context of economic, social and political concerns.

Tableau 1 : efficiency of water demand instruments

	<i>Demands management tools</i>	<i>sectors of use and major drawbacks</i>										<i>reuse</i> serving more than one sector	<i>selection</i> of water quality according to use	
		<i>Drinking Water supply</i>			<i>self-supplied industries</i>				<i>agriculture (irrigation)</i>					<i>recreational and tourism</i>
		distribution losses	leaks at homes	misuse	losses and leaks	drawbacks of recycling	lack of efficiency of processes	conveyance losses	efficiency drawbacks	choice of suitable crops for water use				
1. Socio-economical	-operation and investments costs for demands management	2	1	?	-	1	0 / 1 / 2	2	1	0	-	1	1	
	-modality of tariff or charge systems		2	2				-	2	1	0	0 / 2		
	-financial incentives (taxing, levies, allowance)	1	1	-	-	2	2	2	-	1	-	1	-	
	-education, information, awareness	0	2	1	-	0	1	1	1	1	1	1	1	
2. Institutional and juridical	-legislation and regulation	0	0	1	0	1	0	0	0	1	1	2	2	
	-management institutions	2	1	1	0	0	-	1	1	-	1	2	2	
	-participation of users	1	2	2	0	2	2	0	1	1	2	-	-	
3. Technical	-knowledge of demands (evaluation, follow up of performance)	1	2	2	1	2	2	1	1	2	2	2	2	
	-action on conveyance losses	1	1	1	2	1	1	2	1	-	-	1	-	
	-action on efficiency of use and storage	0 to 2	1	1	-	0	1	-	1	1	1	1	1	
	-treatment and reuse (waste and drainage waters,..)	-	-	-	-	0	-	-	1	2	1	1	1 to 2	

Proposition for ranking:

- not applicable
- 0. inefficient
- 1. efficient
- 2. very efficient

CONCLUSIONS AND GENERAL RECOMMENDATIONS

ASSESSMENT

MANAGEMENT DRAWBACKS BUT POTENTIAL IMPROVEMENTS

Defects in water demand management lead to loss of resources, both in terms of quantity and quality, as well as economic losses, and consequently lower profitability. There appears to be a lack of awareness of this situation and as a result there is little understanding of the value of water as such.

All users bear some part of the responsibility. Agriculture, however, shows by far the greatest excess consumption.

The volume of water lost or wasted is important. Therefore, it must be recognised that water demand management provides a better solution before other water supply alternatives.

It is technically possible to conserve a large part of the water lost or wasted and this would cost a lot less than the cost of providing new supplies, especially the cost of supplying water to cover future additional needs.

Before increasing production of water, would it not be better to save it? This would be as beneficial to users as to the environment. Moreover, it would diminish the risk of disputes over water use in times of scarcity.

Furthermore, policies that affect population growth, urbanisation, irrigated agricultural production, and energy consumption necessarily have an impact on water requirements, and consequently on demand, even though this is not one of their principal targets. However, reducing the need for water could in some cases be included among these policies' aims.

WELL IDENTIFIED CAUSES

The causes of this unsatisfactory management of demand were studied from three main aspects:

- Legislative: the concept of demand management has not been incorporated in all planning legislation and practices because, for historical reasons, some countries lagged behind, but the balance of power is changing;
- Socio-economic: water has changed from being seen as a natural asset to a rare economic asset, a product. Awareness of this development is not sufficiently widespread among all actors in the water economy. But water also has social, cultural and environmental aspects that must be preserved;
- Technological: in general, the technology exists, but it is not always utilised. At the present time, not every country has access to the most modern technology.

The specific recommendations for these three aspects were detailed previously.

Likewise, some general principles are not always taken into account in management, namely:

- Management of demand in terms of quantity and quality are two related components;
- The possibility of conserving water must be envisaged at each stage of water management (both surface water and groundwater), from extracting the water to use and then the discharge of wastewater into the environment.
- Demand management should focus principally on the weakest link in the chain of

use. (As far as groundwater is concerned, the possibility of refilling water-bearing layers with treated wastewater has promising potential);

- The practice of demand management necessitates a global and consistent vision in terms of time and space, together with constancy and continuity.
- Such a vision requires genuine co-ordination at all levels of action: political, local authorities, management bodies, and users;
- All demand management tools should be utilised in harmony.
- Such a synergy enhances the effectiveness of management provided that application of the tools is co-ordinated by the same management authority;
- Water demand that depends on taking water from rivers must respect the maintenance of an “acceptable minimum level” for the ecological conservation of ecosystems, which are also users in their own right;
- Management of demand or supply (resources) are not alternatives. Management of water demand neither replaces nor competes with management of supply, but complements it within the context of integrated water management.
- Legislation and political will must provide the framework and the financial resources to promote the application of the most modern technological options.
- At the same time, education and public information must lay emphasis on the existence of effective technical choices to save water and assess users’ demands, and on the importance of applying them at all levels.

RECOMMENDATIONS TO GUIDE ACTION

1) To develop among the public, economic actors, managers and decision-makers awareness of the importance of loss and waste of water, both in economic terms and in volume of water, and to incite a sense of responsibility among users with a view to better management of water demand.

- Implement awareness promotion campaigns at all levels:
 - *focus in particular on each user’s responsibility for waste, the water that can be conserved by combating wastage with simple behaviour;*
 - *make people aware of the value of water and the risk of shortages, followed by medium-term and long-term action;*
 - *obtain the support of associations and utilize all types of audiovisual communication media, (including a leaflet for the public showing the results and conclusions of the workshop), educational materials and action (“water classes”) adapted to each country.*
- Facilitate access to information on water demand:
 - *provide information on water prices and charges;*
 - *utilise the active participation of expert water networks in the Mediterranean and study the possibility of facilitating exchange of information through the development of a Euro-Mediterranean information system on know-how in the water sector, which was agreed in principle at the water management conference held in Marseille. The theme of demand management must be spelled out in the concept of such a system.*

2) To improve among the same players, knowledge and evaluation of the potential earnings from more economic management of water demand, laying emphasis on total transparency of management.

- Set up mechanisms for collecting data in order to have a better knowledge of the efficiency of the

networks and use systems:

Including:

- *metrology (installing equipment to measure water outflow, quality, etc...). Control and maintenance of metering systems at all levels: production, distribution, consumption, are preconditions for any approach to saving water. There must be strict follow-up and maintenance policy and appropriate equipment;*
- *more comprehensive, more precise and more regionally-focused information on water use in each sector (quantities and variability, real needs and use yield, but also quality, modes of supply, role of intermediaries, payment of costs, flexibility, price effects, etc.);*
- *institutional strengthening (water institutes, water observatories) permitting regular analysis of relevant measures and data in order to give decision-makers objective elements on which to base decisions and subsequent monitoring and to supply the public with transparent information.*
- Prepare and take into account indicative use standards for the major forms of use in terms of quantity and quality:
 - *these help to identify real needs and serve as a reference point for estimating wastage;*
 - *promote research in this area.*

3) **To incorporate water demand management effectively in national water strategies and development policies.**

- Promote effective incorporation of demand control objectives in water planning policies and in all sectoral development policies that have an impact on water requirements:
 - *analyse and influence the interaction between water management and sectoral development policies.*
- Undertake feasibility studies on water conservation possibilities (potential savings, methods, costs, time limits, legal, financial and control criteria, etc.):
 - *evaluate more precisely the feasibility of demand control operations under different circumstances and in different socio-economic and cultural situations. The volume of water to be conserved at competitive cost in comparison with the equivalent resource mobilization or additional water volume production have to be estimated.*
- Promote investment in activities that use water as efficiently as possible (particularly in agriculture and industry):
 - *ensure that investment (restoring or building new networks, use methods, cultural choices) is preceded by feasibility studies on scenarios that also incorporate comparisons of the effect on demand;*
 - *recycling by industry in particular must be advantageous.*

4) **To undertake practical demand control activities**

- Carry out pilot projects to improve the efficiency of use systems (networks, processes, etc.):
 - *aim in particular at proper capitalization and utilization of the results in order to develop such strategies.*
- Improve the efficiency of water distribution and use networks, focusing on maintenance at the same time:
 - *improve control of water distribution (flow, pressure), especially control downstream (drinking water, irrigation);*
 - *envisage privatizing water distribution services with caution, gradually and transparently, when this can help to improve distribution networks;*
 - *set quantified good management targets of general interest for distribution bodies, for example, through contracts drawn up when the State allocates resources;*
- Develop sophisticated and graduated systems of prices and charges:
 - *this implies that awareness of the real cost of producing, distributing and treating water should be more transparent, i.e. there must be clear accounting procedures in the management bodies so that the water cost/price*

differential, and consequently the impact of various political options for setting prices, can be estimated better;

- *take into account demand management objectives properly (according to the different forms of use, extraction methods, water quality ...). The method used to fix water charges must be clear in order to be understood, easy to use in order to be applied, realistic in order to be accepted. Gradual fixing of charges by volume for agriculture and for drinking water is deemed preferable.*
- Make users directly understand the meaning and objective of financial incentives in the form of penalties (taxes, charges ...) or encouragements (subsidies). These can be other tools to orient consumption.
- Promote better incorporation of the imperatives of demand management in all sectoral development policies so as to reduce demand:

Including:

- *better understanding of the interaction between water management strategies and sectoral development policies that have an impact on water demand in each country;*
- *strengthen the role of co-ordination institutions at the national level in relation to water demand (regime to authorize the extraction of water, etc.);*
- *institutionalize participation by users in decision-making (association of farmers using irrigation, etc);*
- *if there is an authorization regime, an effective water police provided with the human and financial resources.*

5) To encourage cooperation among groups of countries facing the same demand management problems and future shortages:

- Encourage the transfer of know-how by and for managers:

Including:

- *the transfer of technology and training for proper mastery of effective water conservation technologies;*
- *exchange of experience among countries that face common problems but have different and complementary strategies;*
- *ensure that water demand management becomes an area of training that is equally as important as resource management for technical managers of water planning and use.*
- Implement economic and technical cooperation on water in line with the objectives of water demand management:
 - *promote cooperation that will lead to water conservation;*
 - *ensure that the strengthening of economic partnership, through the establishment of a free trade area by the year 2010 and through financial cooperation, will not have a negative effect and lead to environmental degradation in the management of natural resources, including water, and will ensure the food security of the most vulnerable countries. These are two essential requirements for the establishment of the components of sustainable development within a systemic and rational approach.*

ANNEXES

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Secretariat des Nations Unies /United Nations secretariat

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COMPOSITION OF WORKING GROUPS

GP 1 : socio-economical			GP 2 : institutional			GP 3 : technical		
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Hamdane	TN	rapporteur	De Carmantrand	RMC	rapporteur	Benedini	IT	rapporteur
Catafago	LB		Jaber	LB		Ezzat	EG	
El Hebil	MA		Ennabli	TN		Alkan	IL	
Lacroix	IME/FR		Kuleli	TR		Andelic	BK	
Le Landais	BRL		Carevic	HR		Efelerli	TR	
Borelli	WWF/IT		Nuri	AL		Gasevic	BK	
Riolo	MT		Juvanvic	SL		Ioannou	CY	
Margat	PB	note taker	Bragante	PB	note taker	Ribas	Eco Méd	
Krinner	AEE/CEDE		Comeau	PB		Bontoux	IPTS	
Glass	PB		Louvet	OSS		Ghini	GR	
Casal	FR		Ostojic	HR		Vallée	PB	note taker
Haener	OIE					Margeta	PAP	note taker

CODES AND ACRONYMS

- the countries and territories are sometimes cited with a code and grouped in four groups, as follow :

Groupe1		Groupe2		Groupe3		Groupe4	
AL	Albania	CY	Cyprus	DZ	Algeria	EG	Egypt
BK	Bosnia-Herzégovina	ES	Spain	WE	West Bank	LY	Libya
HR	Croatia	LB	Lebanon	GZ	Gaza		
FR	France	MA	Marocco	IL	Israel		
GR	Greece	SY	Syria	MT	Malta		
IT	Italy			TN	Tunisia		
MC	Monaco						
YU	RF de Yougoslavia						
SI	Slovenia						
TR	Turkey						

- institutions and organisations cited :

APNEK	<i>Association pour la protection de la nature</i>
AEE	<i>Agence Européenne de l'Environnement</i>
CEDARE	<i>Centre for Environment and Development for the Arab Region and Europe</i>
BRL	<i>Compagnie du Bas Rhône Languedoc</i>
CEDEX	<i>Centro de Estudios y Experimentación de Obras Públicas</i>
CEFIC	<i>European Chemical Industry Council</i>
MCS D	<i>Mediterranean Commission on sustainable development</i>
CNUED	<i>Conférence des Nations Unies sur l'environnement et le développement</i>
ECO - MED	<i>Ecomediterranea</i>
IME	<i>Institut Méditerranéen de l'eau</i>
MIO-ESCDE	<i>Mediterranean Information Office for Environnement, culture and sustainable développement</i>
PAM	<i>Mediterranean Action Plan</i>
PB	<i>Regional activity centre / Blue plan for the Mediterranean</i>
PAP	<i>Regional activities centres / priority action program</i>
OIE	<i>Office International de l'eau</i>
OSS	<i>Observatoire du Sahara et du Sabel</i>
RMC	<i>Agence de Bassin Rhône Méditerranée Corse</i>
SCP	<i>Société du Canal de Provence</i>
WWF	<i>World Wild Fund for Nature</i>

GLOSSARY

Discharges : difference between water demand and net consumption (mainly in community and industrial sectors).

Final consumption : par of the withdrawals which is not returned to the environment (inland fresh water) after use ; it is either consumed by activities or discharged into the sea or to evaporation basins (blind basins).

Efficiency drawbacks : These are the defects of processes and systems of use.

-in irrigation : it is the ratio between = water used per plant/water provided to the field (surface water irrigation efficiency : 75%, micro-irrigation efficiency : 90%)

-in industry : it is the ratio = nb of m³ necessary per tons of product

-for the domestic uses : it is the nb of litres necessary for any given domestic use. For example the number of litres needed for a shower or a laundry etc.

Losses : There are all the losses in the hydraulic system (from storage until use). They are of two kinds : either the drawbacks in works (leaks, badly closed flood gates, holes etc.), either drawbacks in regulation or control which do not allow to adjust the withdrawal upon the resource with the withdrawal of users.

Misuse : This occurs when there is an excessive withdrawal which is either unauthorised, against the law or linked to the user's bad behaviour.

Net water availability : difference between total resources and final consumption.

Recycling defects : They occur when there isn't any reuse or water either in the same system of use or by another type of user or a series of users (when it is possible).

Water demand : determined by the needs of users activities and the conditions of water supply, it is covered by water production : withdrawals, non-conventional resources, fossil aquifer exploitation, imports.

Water need : concept independent of supply, having a normative and predictive character ; determined by the needs and objectives of the activity generating it.

Water supply : natural water resources (renewable and non-renewable), non conventional production (desalination, reuse...) , imports.

Water production : motivated by demands, includes essentially withdrawals (exploitation of natural resources) and in some cases, non conventional productions.

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