MedWater Policy

Policy Initiative to Overcome Water Competition between the Vital Economic Sectors of Agriculture and Tourism in the Mediterranean

Adaptation of Policy Modules to the MEDWATER Target Regions

Case Study Cap Bon Region

Deliverable of WP 6

June 2003

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Introduction

Each MedWater target region has a particular profile and is facing individual problems. In consequence the water conflict in each region has a different character and therefore requires an individual sustainable water policy initiative. Consequently, the elaborated policy modules of the Transboundary Water Policy Initiative are to be adapted to the specific conditions of each target region. In an exemplary way water policy initiatives are formulated for each of the MedWater target regions which are:

a) **Cap Bon region in Tunisia**
b) Dead Sea Area in Jordan
c) Fethiye Region in Turkey
d) Jericho district in Palestine
e) Naxos Island in Greece

Policy Initiative for the Target Redion Cap Bon in Tunisia

Every water policy initiative aims to generate a strong conflict solving potential between the vital economic sectors of agriculture and tourism. **Policy targets** which promise a very efficient ratio between efforts and effects are defined. This definition is based on a careful analysis of the current water situation in the target region and the respective technical and socio-economic reform potential. Based on this analysis the most promising **policy modules** are selected which are necessary for achieving the reform targets. With this methodology four highly important policy targets for sustainable water supply for Cap Bon Region in Tunisia have been developed. The policy targets and the appropriate policy modules are summarized in the following table:

Policy Module	**Improvement Conventional Water Resource Management**	**Implementation of Desalination Units**	**Implementation of Wastewater Treatment Technologies**	**Cultivation of Water Modest Crops**
Legislative Framework			Pollution Prevention Legislation	Binding Program for Water Modest Crops
				Restriction of Groundwater Irrigation
Water Pricing Scheme	Reduced Subventions for Water Supply Utilities	Progressive Taxation		Progressive Taxation
				Adaptation of General Subsidies
Institutional Framework	Decentralized and Interlinked Water Supply Facilities	Liberalization and Public Private Partnership		Strengthening of Water Authorities and Supply Facilities

	Liberalisation and Public-Private Partnership			Public Private Partnership
Mobilizing of Financial Resources		Direct Governmental Subsidies	Direct Governmental Subsidies	
Public Actions and Capacity Building	Promotion of an International Water Resource Agreement	Public Dialogue	Public Dialogue with Tourism Companies	Public Dialogue
		Training of Decision Makers	Training of Decision Makers	Enhance of R&D Capacities

Policy Target: Improvement Conventional Water Resource Management

Situation in the Region

Water scarcity is endemic in Cap Bon region, which makes the area particularly vulnerable to any reduction in supplies. The common benchmark for water scarcity is 1.000 m3/per person per year. In Cap Bon water availability falls below this level. Variability of precipitation directly influences runoff and ground water levels throughout Cap Bon region. But also other processes damage conventional water supplies, such as poorer infiltration due to soil degradation, which reduces aquifer recharge and at the same time reservoirs could be seriously affected by an increase in sedimentation due to increased erosion.
The problem of reduced water availability will be compounded by demand increases resulting from both socio-economic factors and climate change itself. Problems of saline intrusion will be further exacerbated by reductions in runoff and by increased withdrawals in response to higher demand. Excessive demand already contributes to saline intrusion problems in many coastal areas of Cap Bon.
There is no doubt that many opportunities exist to improve supply through demand side management and increasing the efficiency of water use, for example through improved irrigation systems, changes in crops and so on. However, an improvement of the conventional water resource management is indispensable, as it will contribute significantly to a higher water use distribution efficiency.

Technical Option: Adoption of an Integrated Approach for Water Resources

The integrated water resource management is a frame for coordinating sector's needs, water policy and water related questions. Moreover, it supports the coordination of distribution and resource management in the context of socio-economical and environmental development objectives. It assures systematic processes that relate water policy to the formulation and execution of the programs, and furthermore improves decision making processes and natural resources management.
The adoption of an Integrated Approach for Water Resources is very beneficial for the government for following reasons:

a) it evaluates all resources including non conventional and water use in detail considering qualitative and quantitative aspects;
b) it incorporates directly social and environmental considerations into political decision making processes;
c) it directly involves all partners, which are linked to water resources;
d) it constitutes a tool to optimise financial and investment funds, which is of particular importance for the financial situation of Cap Bon.

Policy Modules Supporting this Policy Task

Policy Module: Reduced Subventions for Water Supply Utilities

The water price has to be evaluated at the real economic level taking into consideration infrastructure price, distribution and maintaining costs and costs now covered by governmental subventions (from water winning to user). The evaluation of the real water price is for all sectors very important in order to further develop/stimulate disposal of non conventional water resources. The modernization of transport and water distribution systems, as well as the disposal of non conventional water resources have a then particular potential.

Policy Module: Decentralized and Interlinked Water Supply Facilities

Water management consists of: a) proper resource management; and b) water supply services. Water resource management includes political aspects, juridical as-

pects, resource distribution and environmental aspects. The formulation of a national water policy is an inherent function of the central government. However, many other aspects related to water management could be delegated to regional institutions or organizations. Participation in decision making processes at a regional level resulting from decentralization, would not only favour clear responsibility and transparency conditions, but also positively influence water management and engagement in general.

Policy Module: Liberalisation and Public-Private Partnership

Water supply generally implies water sales services, acting as a go-between institution. This services are responsible for selling water to different final users - domestic use in municipalities, farmers for irrigated areas, etc. Water supply could be assured by public, private services or an intermediate public-private partnership. It is necessary to strengthen the role of the private sector in order to provide an efficient service regarding costs and quality, based on efficient rules and regulations in urban and in rural sectors.

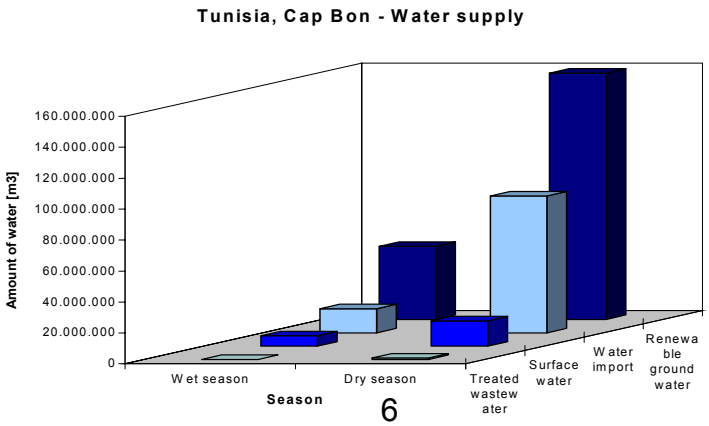
Policy Module: Promotion of an International Water Resource Agreement

The national government is the main responsible for the formulation of the water policy and the financing of their execution taking into account their specific priority for Tunisia. However, the international community has to play an important role to strengthen and assist the development and coordination of water programs. The establishment of an Eastern Mediterranean organization with regional secretaries coordinating water issues, could facilitate partnerships and the creation of a water network between the countries of the Middle East, North Africa and the Mediterranean region. An international organ is crucial for the success of strategic actions described previously.

Policy Target: “Implementation of Desalination Units”

Situation in the Region

The region Cap Bon is crucial for the national agriculture production. The peninsula only represents 1.75% of the national area, but it assures around 15% of the national agriculture production. Therefore, agricultural production significantly determines the wealth of the region. Of the 186 000 ha agricultural land 40 500 ha is irrigated .The consumption of water is estimated to be around 17 to 21 m^3 /day /ha. As the agriculture sector is expanding steadily, the water demand for irrigation is by far the largest and most rapidly growing fresh water sector. The huge agricultural water demand is covered by the extensive use of groundwater aquifers and by water imports. The dependence on these two water sources is particularly high in the dry summer season, when the demand peaks for tourism and agriculture can be found. The water supply situation of Cap Bon Island can be highlighted in the following figure.



The current water supply structure has negative economic effects and creates severe environmental damage. The water import over long distances requires expensive infrastructure and creates high losses in the distribution systems. Moreover, the overexploitation deteriorates the fossil groundwater sources of the region.
Therefore, it has to be a major policy target to release the pressure on the non-renewable groundwater sources. In this additional water supply from surface water cannot be an alternative. In the near future Tunisia will exploit about 90% of its surface water resources. Water imports, as mentioned before, are an expensive and inefficient option. Thus, the focus has to lie on the exploitation of non-conventional resources, saline brackish and wastewater sources.. Desalination is still not implemented in the Cap Bon region at all. The policy initiative therefore should initiate desalination projects in the agricultural sector. As first step desalination units should be applied for economically strong and large farming units producing profitable world market products.

Technical Option: Implementation of Desalination Units

Desalination should focus on saline and brackish water resources. The desalination plants are to be supplied with energy generated from renewable energy sources. Cap Bon Region has abundant wind and solar energy resources, of which wind energy is already generated for other purposes. The most versatile desalination technology for Can Bon Region is Reverse Osmosis(RO) which can deal with fluctuations in energy supply. The latter aspect is especially important in the case of wind and solar energy. Furthermore, RO produces freshwater with the smallest energy demand of all desalination technologies. Consequently, recommendations for Cap Bon region can be made. Firstly, wind energy based RO (WEC-RO), which offers a larger-scale production of desalinated water than PV desalination. WEC-RO could therefore serve for example a number of farming units. Secondly, PV-RO is a suitable solution for small-scale desalination. It is particularly appropriate for stand alone operation. PV-RO is a logical solution for single farming units.

Policy Modules Supporting Policy Task

Policy Module: “Progressive Taxation”

Desalinated water is much more costly than the non renewable groundwater sources. Thus, large scale implementation of desalination units can only be accomplished by a certain raise of water supply tariffs. The most appropriate tariff reform is progressive taxation in which higher prices are charged for above average water consume. The high prices charged to large water consumers can be then used to cross-subsidise the desalination based water supply.

Policy Module: “Liberalisation and Public Private Partnership"

A close collaboration of public and private sector are required in the case of renewable energy based desalination plants. Two major characteristics of Public Private Partnership, the economic strength and the specific knowledge are of great advantage. Mediterranean companies, which have already experience in this field could run complete desalination units or take-over training of farmers and maintenance services.

Policy Module: “Governmental Direct Subsidies”

Privately operated decentralised desalination units would be an important step in favour of sustainable water structures. However, the implementation costs of desalination are high and often exceed the farmers’ economical possibilities. Direct govern-

mental subsidies are strong incentives for the construction and operation of desalination units for example by cheap loans provided by the regional municipalities or the national government. Such kick-off support helps to make out of desalination plants a reasonable option for farmers.

Policy Module: “Public Dialogue”

The implementation of desalination plants will only be possible if farmers are sufficiently informed about the effects of groundwater overexploitation and about the option for taking brackish and seawater as an alternative. Moreover, information has to be disseminated about the governmental financial support programs.

Policy Module: “Training of Decision Makers”

A sound training regarding the implementation and use of desalination plants is to be offered to farmers. If they opt for a smaller unit, like in the case of PV-RO a maintaining service might be far too expensive for them and the capacity to deal correctly with elementary applications and problems is essential. The regions municipality or also the GIC could take over the responsibility for organizing such training sessions. This service will support the farmers in their decision to dare the investment.

Policy Target “Implementation of Wastewater Treatment Technologies”

Situation in the Region

Tourism in Cap Bon has a very water intense character. The MedWater report has analysed an average water consume of 600 litters per tourist accommodation. The reason for this over-average water demand is the domestic tourism structure characterised by large hotel resorts with extensive green and leisure areas, including golf courses and swimming pools. Today, the required irrigation water for these green fields is take from groundwater and surface water resources.

Wastewater treatment is comparatively advanced in the Cap Bon region. Nine wastewater plants are under operation, which treat 21% of the overall wastewater potential. The treated wastewater in most cases is discharged. Only one station is directly linked to an irrigation scheme of 37 ha**.**

It is an important political task to enhance the use of treated wastewater for irrigation purposes. The Tunisian government agrees to this point of view and set the political objective to enhance the reuse of treated wastewater for additional irrigation space of 20,000 ha and the refilling of aquifers. Particularly promising is to use the treated wastewater for greenland irrigation in the tourist resorts. These irrigation purposes require a reduced water quality and thus less costly water treatment devices. During the dry season a few hotels are already using wastewater for the irrigation of their green spaces.

Technical Option: Implementation of Wastewater Treatment Technologies

The large water demand in the hotel resorts is an interesting potential for non-conventional water supply. This wastewater should be purified and then used for the irrigation of the hotel’s green spaces, such as gardens and golf courses. This irrigation purpose allows reduced quality of the effluents in respect to organic substances and germs. A pre-treatment unit for sedimentation should be followed by a second aerobe or anaerobe purification unit. The most appropriate technology has to be selected for every plant individually out of the wide spectrum of suitable wastewater technologies.

The treatment technology has to be combined with a pollution prevention strategy within the hotel management. Most dangerous pollutants such as heavy metals and

chemicals have to be kept out of the wastewater by an advanced hotel water management preventing water pollution. Major possibilities are the reduction of strong chemicals used for cleaning and hygiene, introduction of biodegradable soap and washing powder. The enhanced pollution with germs and coliforms can be prevented by the installation of a separate water cycle for the so-called black water.

Policy Modules Supporting this Policy Task

Policy Module: “Pollution Prevention Legislation”

It was shown that the prevention of water pollution in the hotels is a vital prerequisite for wastewater reuse. Hotel complexes have usually enormous possibilities to reduce the wastewater contamination. Therefore, it has to be evaluated, if the implementation of these measures should be supported by national legislation.

Policy Module: “Direct Governmental Subsidies”

The implementation of a purification unit creates considerable expenses for the hotel owner and should therefore be supported by governmental subsidies for giving additional incentives as a kick-off aid.

Policy Module: “Public Dialogue with Tourism Companies”

Governmental bodies should start a well-designed PR campaign addressing directly tourist companies and hotel managers. This PR campaign should compile publications and organize information events explaining the social, technical and financial aspects of sustainable water reform. A strong tool is to create a water efficiency label which is given to companies with proven water saving merits. This label gives tourism companies the possibility to make reference to this label in their advertisement as additional quality criteria. Emphasis has to be given to award the water efficiency label in a transparent and open process.

Policy Module: “Training of Decision Makers”

A comprehensive information basis for hotel managers is required to convince them to initiate waste water treatment within their tourism resort. The decision maker has to understand the technical conditions of such a plant as well as the economic effects and the possibilities for public funding. Moreover, it would be a drastic reduce of operation costs if the maintenance could be overtaken by the hotel staff itself. All this requires a governmental initiative for providing cheap and effective training sessions. SONEDE (the National Water Authority within the Ministry of Agriculture), which is supplying the hotels with water, could be a suitable body for organizing these training sessions for hotel owners, managers and their technical staff.

Policy Target “Cultivation of Water Modest Crops”

Situation in the Region

In Cap Bon Region highly profitable crops are cultivated. The peninsula contributes 42% to the national production of table grape and 70% to the national wine production. Moreover, nearly the complete national threshold of citrus fruits is produced on the peninsula. Most of these crops are very water consuming. Particularly citrus fruit and grapefruit plantations need a highly intense irrigation with more than 12.000 m^3/ha followed by potato cultivations with a water demand of around 7.000 m^3/ha and wheat with around 6600 m^3/ha. In the future it is going to be inevitable to shift to more water modest crops and agricultural techniques. These alternative products and techniques however have to generate sufficient economic yield for ensuring the economic basis of farmers. Only with new or improved products can agricultural production in Cap Bon Region be guaranteed in the future. Particularly, desalination can

only be a viable option for the agricultural sector when the water demand per hectare is significantly reduced. A major political task therefore addresses the field of more water modest production.

Option for Water Modest Crops

Many traditional domestic crops have a modest water consume, which is to large parts required in the wet season. Moreover, intense research was performed on the definition of water stress and salt resistant crops that generate sufficient economic yield. Moreover, genetic manipulation has brought remarkable progress in the plant's capacity to cope with arid climate conditions. These improvements however have to be balanced with the environmental risks of Genetically Modified Organisms (GMOs).

Policy Modules Supporting this Policy Task

Policy Module: "Binding Program for Water Modest Crops"

In other arid MENA regions like Jordan the government has introduced a binding program, which is restricting the agricultural products to water modest plants. The experiences in Jordan have shown that this can be a suitable tool, if this regulation is accompanied with additional policy modules that help assuring its compliance.

Policy Module: "Restriction of Groundwater Irrigation"

The program for water modest agricultural patterns requires the restriction of the individual water supply. There is already a valid legislation, which puts the exploitation of groundwater below 50 meters under governmental permission. The implementation of this regulation however can still be improved.

Policy Module: "Progressive Taxation"

Progressive taxation is to be applied to the agricultural sector. If prices are increasing exponentially the more water is used, irrigation for water intensive crops as citrus fruits starts reflecting the real production expenses. Progressive taxation has to be applied in a way that low water prices allow the production of crops with a sustainable water demand. Water contingents which are required for the irrigation of water intense world market products are then charged with drastically enhanced prices..

Policy Module: "Strengthening of Water Authorities and Supply Facilities"

The administrative set-up for imposing agricultural programs has to be improved. The Grouping of Interest (GIC), the organization in charge of the management and distribution of irrigation water to the farmers, holds a crucial role in the conflict solving process in Cap Bon region. Experience showed that a stakeholder participation in the distribution institutions is having very positive effects on the efforts made by farmers to reduce their water consumption.
Furthermore the acceptance of measures to be taken is increasing substantially if they are directly involved. An evaluation and possible elaboration of a reform of GIC should be considered.
It requires strong and independent control unit with sufficient personnel strength and expertise for monitoring the agricultural and water consume patterns and impose the water supply restrictions. These control entities are to be completely independent from the agricultural bodies.

Policy Module: "Public Private Partnership"

Public and private cooperation can be especially fruit bearing with respect to the research progresses in the field of water modest plants. Therefore, private research institutes, which are lancing projects in the field of water modest plants and agricultural methods should find decisive governmental support.

Policy Module: “Adaptation of General Subsidies”

Citrus plantations and other world market products are supported by governmental subsidies in various ways for example by the provision of cheap chemicals and energy. These subventions have to be adapted to the urgent necessities to reduce agricultural irrigation water demand. Therefore, direct subsidies are to be evaluated and reduced wherever they are fostering the cultivation of water intense crops. They have to be redesigned in order to substitute the economic losses provoked by the agricultural reforms and training activities, to deal correctly with new crops.

Policy Module: “Public Dialogue”

The promotion of water modest crops has to be accompanied by a well-facilitated public dialogue. Farmers are to be informed that even if the economic yield is limited at the beginning, the reform of the agricultural sector is inevitable for ensuring the future of the region. Moreover, the governmental adjustment payments should be explained in a broad dissemination campaign.

Policy Module “Training of decision makers”

Water efficiency in every sector of society is based on knowledge. This is particularly the case for the agricultural sector where enormous amounts of irrigation water can be saved by enhanced knowledge on water efficient irrigation technologies and agricultural strategies. This knowledge which is continuously increased by aggressive research and development work has to be brought to the farmers by broad training actions.

Policy Module: “Enhance of R&D Capacities”

In the vital field of water modest agricultural products and agricultural methods additional governmental investment in research and development capacities is required to find new solutions for improving water use efficiency. Investigations focussing on suitable crops for (semi-)arid regions will offer farmers an alternative to large-scale citrus fruit cultivations. The water conflict in the agriculture sector is a wide spread problem of semi-arid and arid regions. Cooperation with regions of the Mediterranean or even from other parts of the world would be advantageous for both sides. Specific knowledge and experiences can be exchanged and would stimulate and advance local investigation.