



Deliverable for WP6

Transboundary Water Policy Initiative for Overcoming Intersectoral Water Competition

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*The overarching challenge for the UN in the 21st century
is to raise the productivity of water,
to bring about a blue revolution
Kofi Annan*

Introduction

The immense social, economic, environmental and even spiritual values of water, which touches all aspects of human civilization, can best be summarized by the well-known slogan, "water is life". So it is highly alarming that the warnings of the Club of Rome in his 1972 published report "The Limits to Growth" proved in no other field so true as it did in the sector of water supply: In the last 100 years the global water consumption has grown by the factor 10¹. Today 31 countries are defined as water scarce, already 2025 it will be around 50 countries with overall three billion inhabitants. In the year 2003 the vast majority of water supply was taken from non-renewable groundwater resources. The remaining resources not only diminish by this continuous overuse, their quality also suffers heavily from pollution and seawater intrusion.

In parallel to this overuse, today 1,2 billion people do not have sufficient access to affordable water resources. All over the world it is the poorest that suffer most from the depletion of water resources. It is assessed that each year 12 - 15 million people die from so-called water-borne diseases². Finally the water scarcity creates severe damage to major eco-systems that provide the living basis for many people, plants and animals. The total area of wetlands e.g. was halved in the last 50 years. In view of the ecological disaster of the Aral Lake, it can be assessed what danger for the entire Middle East lies in the permanent dropping of Dead Sea surface level³.

These horrendous figures and scenarios brought a strong impetus to the scientific research and analysis work. International conferences served as important milestones to bring the new understanding into political principles and objectives:

- In 1977 the United Nations Conference on Water in Mar del Plata established the principle that "people have a right to water for their basic needs".
- The Dublin Conference on Water and the Environment (1992) recognized sustainability as key issue and formulated four "Dublin Principles" which should guide all water policies⁴. The Dublin Principles emphasizes that freshwater is finite and vulnerable resource, that water development and management should be based on a participatory approach, that women play a central part in the provision and safeguarding of water and that water has an economic value in all its competing uses. The United Nations Conference on Environment and Development in Rio de Janeiro in 1992 endorsed the Dublin Principles.
- In Preparation of the World Summit of Sustainable Development in Johannesburg in 2002 the Bonn Keys have been adopted at the International Conference on Freshwater in Bonn in 2001, which focus their Recommendation for Action on three major fields: Governance, Management and Partnerships; Mobilizing of Financial Resources; Capacity Building and Sharing of Knowledge⁵.
- The Millennium Declaration of 2001 set the target to reduce by half the proportion of people without sustainable access to safe drinking water by 2015.
- On the Johannesburg Summit in 2002 the world community moreover agreed to reduce by half the proportion of people without access to basic sanitation.

¹ See Welthungerhilfe 2003

² See Welthungerhilfe 2003

³ See MedWater Report 2 2002: 15

⁴ See The Dublin Statement 1992

⁵ See Catley-Carson 2001

- The EU Athens Conference “Sustainable Development for Lasting Peace: Shared Water, Shared Future, Shared Knowledge” in May 2003 implemented the goals of Johannesburg by starting two regional framework programs.
- The Ministerial Declaration of the Third World Water Summit in Kyoto from March 2003 brought together all necessary actions in a nutshell.

Over the past ten years great progress has been made on the international understanding of global water problems. Today, it is generally agreed that the problem lies in the coming together of severe water scarcity in many regions and the dramatic misuse of water resources in parallel. Water has to be understood in three major functions:

- 1) As a basic human need, which has to be supplied to everybody sufficiently and at affordable prices.
- 2) As a prerequisite for ecosystems, which preserve livelihood to many people, plants and animals.
- 3) As an economic good with strong monetary value, which has to be allocated with respect to its real cost and should create the maximum possible yield per unit of water consume.

All experts agree that an “efficiency revolution” is required. The yield per water consume unit has to be optimized to serve human basic needs and to create economic development and social prosperity. The enhanced efficiency in water use will allow the allocation of an uncommitted outflow for protecting the water households in ecosystems.

Water issues must be tackled in a very broad context particularly of land use policy. Deforestation and agricultural patterns have a major impact on the on-site water situation. Water and poverty are two closely entwined subjects. Without adequate clean water there is no escape from the poverty trap⁶. Latest analysis work goes beyond this position and postulates that sustainable water supply can only be accomplished over the eradication of poverty⁷. In this understanding the financial, institutional and economic crises in many developing countries in the world have to be defined as the main target of all reform action agendas. In these agendas sustainable water policies are recognised as important contributions to the eradication of poverty.

A successful water policy combines various components into a well-balanced mixture. The basic tools are integrated water plans. The Ministerial Declaration of the Third World Water Forum in Kyoto gave recognition to these tools and agreed to develop integrated water resource management and water efficiency plans by 2005 in all contract countries.

⁶ See Welthungerhilfe 2003

⁷ See Abrams 1999

Implementing Bodies

Solving the inter-sectoral water conflict is a complex problem, which involves various actors with specific responsibilities and implementation tasks. One of the key actors in the water conflict and traditionally the most influential one are national governments. Governments and governmental bodies have the original responsibility to protect and allocate water resources to serve individual and public interest. A key governmental task is to safeguard the water need of the total population, especially the one of underprivileged and to assure the water supply for the ecosystems. Furthermore, governments are responsible for all kind of water supply related legislation. They also have the competence to determine the pricing schemes in each particular country. Any institutional reform process requires governmental initiation and facilitation and finally, every international process is carried by national governments.

Although government is covering most of the key functions in water conflicts, the complexity and size of the pressing water problems go beyond governmental capacities. Thus, cooperation with other economic and social sectors is indispensable. Especially a stronger involvement of the private sector is required, contributing specific knowledge and financial resources.

Apart from the classical public and private institutions a strong involvement of civil society is inalienable. Water conflicts can only be solved with recognition of the important role of the civil society as a key actor. Entities for civil society involvement are political parties, NGOs and scientific institutes. Broad awareness among the total population influences the water conflict substantially.

The major tool to overcome water competition between the economic sectors of agriculture and tourism is the definition of policy modules. The major advantage of such a module based structure is its flexibility and adaptability. The combination of individual modules allows to formulate a specific water policy initiative for each particular target region with its individual framework conditions.

Sustainable water structures require well-working alliances are required between water users and suppliers, private and public bodies, governmental and non – governmental actors, tourist and agricultural companies, local regional national and supranational institutions. Therefore, in the analysis of the policy modules special attention has to be paid to the roles to be fulfilled by individual actors.

Definition of Policy Modules

MedWater Policy aims to formulate strategies for overcoming water competition between the vital economic sectors of tourism and agriculture. Therefore, it is necessary to define policy modules in respect to the particular requirements of the MedWater objectives⁸. The following Water Policy Modules have been defined:

- Legislative Framework
- Water Pricing Schemes
- Institutional Framework
- Water Infrastructure
- Mobilising of financial resources
- Public Actions and Capacity building
- International and interregional co-operation

⁸ More information on the MedWater objectives can be found in the MedWater project contract.

These policy modules have to be formulated for the MedWater relevant fields of actions which are

- Conventional and non-conventional water supply
- Water demand in Agriculture
- Water demand in Tourism Sector

The module structure of the MedWater Policy Initiative can be highlighted in the following matrix:

Field of Action	Water Supply		Water Demand	
<i>Policy Module</i>	Conventional	Non conventional	Agriculture	Tourism
<i>Legislative Framework</i>				
<i>Water Pricing Schemes</i>				
<i>Institutional Framework</i>				
<i>Water Infrastructure</i>				
<i>Mobilising of financial resources</i>				
<i>Public Actions and Capacity building</i>				
<i>International and interregional co-operation</i>				

Table 1 Structure of the MedWater Policy Initiative

Policy Module: “Legislative Framework”

The primary policy option is to enact a suitable legislative framework for sustainable water management, which is to be implemented by the national or regional legislative bodies⁹. It has to be considered that rules and regulation on water management are in place almost everywhere, however their compliance and enforcement often remains weak. Therefore, the design of the legislation has to make sure that the regulation is practical, can be controlled and finds a basic acceptance among the population.

Legislative Framework for Water Supply

There are various legislative options to support sustainable water resource management on the supply side:

Permission for Groundwater Exploitation

In most arid regions, groundwater is by far the cheapest water source, which is available in larger quantities. Therefore, access to groundwater is the precondition for any agricultural irrigation. Obviously, water deficits are mostly compensated by overuse of groundwater resources. Private groundwater tapping causes most of the deterioration of groundwater aquifers. The exploitation of the groundwater resources in many regions is free of any legislative restriction. This follows the idea that the domestic groundwater sources and springs are part

⁹ The potential of legislative often is underlined with the successful example of the EU Urban Waste Water Treatment Directive of 1991.

of the land property. A sustainable water resource management however requires legislative restriction of private groundwater use. Such a regulation must pay attention to the high importance of the groundwater particularly for agriculture and be aware of the long tradition of free groundwater tapping as part of the land property. A suitable balance between the land-owner rights and the need for groundwater protection can be accomplished by requesting permissions for groundwater tapping below a certain level (more than 50 meters e.g. in Tunisia).

As accompanying measure subsidies for any kind of groundwater should be reduced, instead subsidies for unconventional water supply should be given (see policy module “water pricing scheme”). In the long term water rights should be separated from land rights.

a) **Environmental Standards**

The supply with unconventional resources such as waste water, brackish or salt water contains significant dangers for polluting the fresh water sources for example by inappropriate disposal of brine or sludge. Comprehensive legislation can ensure that unconventional water supply stations operate without any harm for the remaining fresh water resources.

Moreover, strict regulation against the pollution of freshwater raises the potential for economically feasible recycling in water cascades. The European Commission Water Directive is a very good sample for environmental legislation on water supply¹⁰.

b) **Water Quality Standards**

Social and economic development in the MENA region is strongly constrained by the continuous decline of the fresh water quality through deposited chemical and organic substances. Low quality water supply forces tourist projects to invest in expensive pre-treatment devices, reduces agricultural yield and damages the fertile soil¹¹.

Moreover, it creates serious health risks for the population. Thus, it is a high legislative priority to create quality criteria for water supply. These criteria should address all kinds of chemical and organic pollutants and should recognize the intended water use. Three types of water use should be differentiated for allowing sound and cost-effective water supply: human needs, irrigation for direct food production and other irrigation purposes. These criteria have to follow existing international guidelines such as the ones from FAO, EU and WHO¹².

Legislative Framework for Agricultural Water Demand

In MENA agricultural irrigation consumes more than 70 % of the total water supply. This figure shows that legislation dealing with agricultural water demand can be an important contribution to sustainable water supply. In parallel, agricultural water demand regulation must adapt to the high economic and social importance of agricultural irrigation. On global scale the irrigated land represents 20 % of the agricultural land but contributes 40 % to the worldwide food production – with growing tendency¹³.

a) **Restriction of Water Intense Agricultural Cultivation**

The water demand of agricultural activities varies with the different agricultural products significantly. While olive plantations in arid regions often do not need any irrigation at all, banana plantations require more than 28.000 m³ / ha and year of irrigation water¹⁴. Moreover, certain agricultural activities – e.g. orchards - have a very positive effect on the overall water household. Thus, governmental legislation can restrict the amount of water intense crops and enforce the plantation of water and soil protecting species, for example with specific subsidies.

¹⁰ See European Commission 2000

¹¹ See MedWater Report 1: 22

¹² See Ayers, D.W. Westcott, 1994

¹³ See FAO 2002

¹⁴ See MedWater Report 2 2002: 13

Such legislation is very sensitive, mainly because it is water intense plantations like citrus or bananas, which bring as a world market products strong economic yield, while domestic water saving plants like alfalfa are to be sold with less profit on regional markets. Therefore, such regulation must be accompanied with financial incentives and subsidies (see policy module “water pricing”). Moreover, the restriction of water wasting agricultural activities should be backed up by the international terms of trade (see policy module “international agreements”).

b) **Efficient and Environmentally Sound Irrigation Systems**

Water intensity of irrigation depends on the used irrigation technology. Demonstration projects have proven that a shift from sprinkler to drip irrigation can cut down the irrigation water demand by 30 – 60 %¹⁵. Moreover, advanced drainage systems are precondition for saving water and protecting the soil and water quality against salinity and pollution. Regulation addressing irrigation technologies can bring a significant contribution for raising water efficiency. These regulations however have to carefully recognize the technical and agricultural framework requirements of the efficient irrigation techniques. Drip irrigation for example is not suitable for low water qualities and its installation is an expensive investment that is beyond the financial strength of many farmers. Therefore the improvements in the irrigation technologies should be accomplished by financial incentives and awareness raising actions (see respective policy modules below).

Tourist Water Demand

Water regulation addressing the quickly growing tourism in all regions of the Mediterranean Basin holds a strong potential for raising water use efficiency.

a) **Restriction of Water Intense Infrastructure**

The MedWater research showed that the average water demand per tourist accommodation depends strongly from the individual design of the hotel resort. Swimming pools and vast green land and in particular golf courses rise the required water amount significantly¹⁶. Sustainable water regulation can restrict the construction of these facilities. A complete restriction again is a very sensitive legislative act that might have a strong impact on the economic prosperity. Tourist resorts stand under strong competition and thus have to fulfill the continuously raising expectations of their guests. Water intense infrastructure is among the main wishes for summer tourists. Therefore, a more suitable solution might be to link the permission of such infrastructure coercively to the creation of additional non-conventional water supply.

b) **Water Saving Architecture e.g. Rainwater Storage**

Rainwater storage and other water saving architecture has a long tradition in the Mediterranean area. Roof cisterns and storage facilities can cover a large part of the garden irrigation water. Governmental initiatives should make these rain water storage facilities and other ways of water saving architecture to binding prerequisite for new hotel construction.

c) **Pollution Prevention**

Prevention of water pollution has to obtain absolute priority, so that wastewater treatment eventually becomes secondary. The recycling potential of wastewater of tourist resorts depends directly on the quality of its effluents. Hotel complexes have enormous possibilities to reduce the wastewater contamination, e.g. by reducing strong chemicals for cleaning and hygiene or by installing a separate water cycle for the so-called black water. Moreover, environmentally sound waste treatment holds strong potentials for water pollution prevention. In respect of the complexity of a sustainable water management of one hotel resort combining technical and socio economic actions, legislation should enforce the elaboration of a water efficiency audit in every tourist resort.

¹⁵ See MedWater Report 3 2002: 9

¹⁶ See MedWater Report 2 2002: 21 ff

Policy Module “Water Pricing Schemes”

Binding water legislation is a strong but also inflexible policy tool. It is obvious that water users themselves know the individual situation best and thus play a key role when selecting appropriate water saving measures. Therefore, incentives for water users, which foster the establishment of sustainable water resource management, are a strong policy tool. Economic incentives can be created by designing water pricing schemes. Since most water supply utilities in MENA countries are under governmental control, governments can easily influence the pricing policy. Also when private entities are involved in the water supply, water pricing can be regulated in respective contracts (see public private partnership).

Prerequisite for any effective water pricing is a functioning metering infrastructure and billing system. All water pricing policy should base on the following principles:

- Affordable supply of water for basic human needs
- Cost reflecting water supply prices based on “polluter pays” principle
- Economic incentives for water saving
- Privileging of water poor economic activities

These principles can be fulfilled by the following policy initiatives:

a) **Consumer Group Targeted Progressive Taxation**

An efficient pricing scheme defines individual water supply prices for specific water use. The price level is defined in accordance with the economic strength of a particular user group. Moreover, the price levels should reflect the general priorities for the economic and social development of a region. In every user group, the prices are progressive, which means that the cost per cubic meter increases when more than a certain quantity is consumed.

Those tariff structures are already implemented in many MENA regions like the Island Naxos in Greece. As shown in the table, the price increases substantially as soon as the amount considered as basic is exceeded (in the case of domestic use: 0-50 m³ and in the case of hotels, restaurants, shops: 100-200 m³):

Water quantity per year	0 – 50 m³	50 – 100 m³	100 m³ - 200 m³	> 200 m³
Domestic use	0,88 Euro/m ³	1,76 Euro/m ³	2,93 Euro/m ³	2,93 Euro/m ³
Hotels, restaurants, shops	2,35 Euro/m ³	2,35 Euro/m ³	2,35 Euro/m ³	2,93 Euro/m ³

Table 2 Water pricing scheme on Naxos Island¹⁷

The introduction of these progressive principles in agricultural sector is indispensable. The definition of the water quantities remains difficult. It is not possible to define a “minimum water supply” per inhabitant that covers the per capita share of water as a basic human need. Every region or even community must find an individual amount—ideally in a public dialogue.

b) **Reduced Subventions for Water Supply Utilities**

Water prices should be near to real expenses reflecting both supply and discharge costs. In arid regions these expenses are so high that public subsidies are inevitable. The following prices of Cap Bon region in Tunisia show the gaps between water supply expenses and water prices¹⁸.

¹⁷ See MedWater Report 1 2002: Subreport Greece

¹⁸ See MedWater Report 1 2002: 18

Consumer group	Prices for water in Euro/m ³	Kind of water supply	Real expenses Euro per m ³
Farmers within GIC ¹⁹	0,013 – 0,092	Surface water	0,54
Free Farmers		Groundwater	0,097
Industry	0,58	Treated Waste Water	0,1
Tourism	0,58	Desalinated water ²⁰	0,72

Table 3 Economical gap in water supply in Cap Bon region in Tunisia²¹

Water utilities distribute water for prices not covering real costs. The huge indirect public subsidies are not transparent. Moreover, it does not give incentives for more water saving measures and hinders economic feasibility of various sustainable water supply investments. Thus, direct subventions for water supply utilities should be reduced to a minimum. The then available public money should be used to support water efficiency measures and exploitation of non-conventional water supply (see policy module “water supply infrastructure”).

c) **Adaptation of General Subsidies**

Economic activities in all MENA countries are supported with various governmental subsidies. Farmers for example can often purchase subsidised fossil fuels or electric energy²². These general subsidies might oppose the objectives of sustainable water resource management, e.g. when subsidised electricity is used for deep groundwater pumping or cheap chemicals are provided for the growth of water intense banana plantations. As far as it is appropriate, these general subsidies should be reduced in favour of less water intense economic sectors like computer business. This shift is practically very difficult to accomplish and of course has to happen under recognition of the real market changes of the new water poor products and services. This step could be supported by public dialogue activities, which would help to increase the consumer’s awareness when confronted with the water poor products.

Policy Module “Redesign of the Institutional Framework”

Fundamental changes in the institutional arrangements and regulations are required to improve water management schemes²³. The prevailing inefficiency of water supply institutions results from the lack of financial and human resources, of incentives and motivation²⁴. The institutions suffer from unclear and limited competences and from having no clear co-operation scheme with other water institutions or other administrative bodies. Therefore, a major political target field for the establishment of sustainable water supply structures are institutional improvements of the water supply. The following action list holds the potential to improve the effectiveness of the water-concerned institutions:

a) **Decentralised and Interlinked Water Authorities and Supply Facilities**

Water supply should be managed by the lowest level possible, crucial role is to be

¹⁹ GIC (Groupment Collective Interêt) are associations which are organising the water allocation within public irrigate areas (PPI)

²⁰ Figure projected by feasibility studies in Tunisia.

²¹ See MedWater Report 1 2002: 18

²² See MedWater Report 1 2002: Subreport Greece

²³ See FAO 2003

²⁴ See Macoun 2000

played by local authorities²⁵. Water utilities need to operate under greater autonomy in their decision-making. The set-up of water related entities should follow a comprehensive and clear co-operation scheme for the entire country. A national co-ordination body for all water related public bodies is required²⁶. The local and national authorities should be imbedded in strong regional co-operation structures orientating along the borders of river basins and neighbouring coastal regions.

b) Enhanced Cross Sector Administration Co-operation

In water scarce regions water related items have to be incorporated in nearly all fields of political planning. Consequently, water related institutions need effective co-operation with all administrative sectors. This is particularly the case for the highly water related fields of land use and energy generation²⁷. Important co-operation partners are the administrative units for agriculture, tourism, transport and industry. Guidelines for regular updates and meetings have to be set-up by the national governments.

c) Installation of Strong Control Entities

On national level independent control entities that have sufficient analysis and monitoring capacities should be set-up. These control units should be under direct supervision of the national government and parliament. The units should permanently monitor the quantities and qualities of water resources and so control the compliance with the water quality standards and allowed quantities of water take-out. The data monitoring must be done in a transparent way (e.g. published in the Internet) and should be linked with other governmental monitoring schemes. Beyond pure water items these control entities should also be able to screen the economic and administrative effectiveness of water utilities and administration and so give consultancy to the public decision making bodies.

d) Water Supply Liberalisation and Public Private Partnership (PPP)

Water supply is originally a governmental task. The size of this task however requires the co-operation of all sectors of society, particularly of the private one. A strong collaboration of private and public sector is therefore essential, if not indispensable.

The term PPP is typically used when a public institution signs a contract with a private company to manage part of a public service or even takes over the complete one, such as it could be the case with water services. Under this type of contract management the ownership remains in public hand, but the private company takes over day-by-day operations and maintenance responsibilities.

Private companies are able to contribute substantially in two important ways: Providing knowledge and access to financial resources²⁸. Moreover, a private company often brings in a level of specialization that is mostly too difficult or too expensive for the public sector alone. Furthermore, if it is an international company, its reach transcends national boundaries, which especially in the case of water management can be very positive. These partnerships base on the understanding that privately managed water services do not imply private ownership of water resources itself. This general guideline is a consequence out of the character of water being no public commodity as any other.

A large scheme of co-operation between the public and private sector have been developed, which contain different levels of delegation to the private sector. A survey can be seen in the following figure:

²⁵ See Global Water Partnership 2002: 26.

²⁶ Lebanon itself holds 22 water authorities.

²⁷ The MedWater research showed that water transport and the exploitation of non - conventional water resources is often hindered by insufficient energy supply

²⁸ See Camdessus 2003

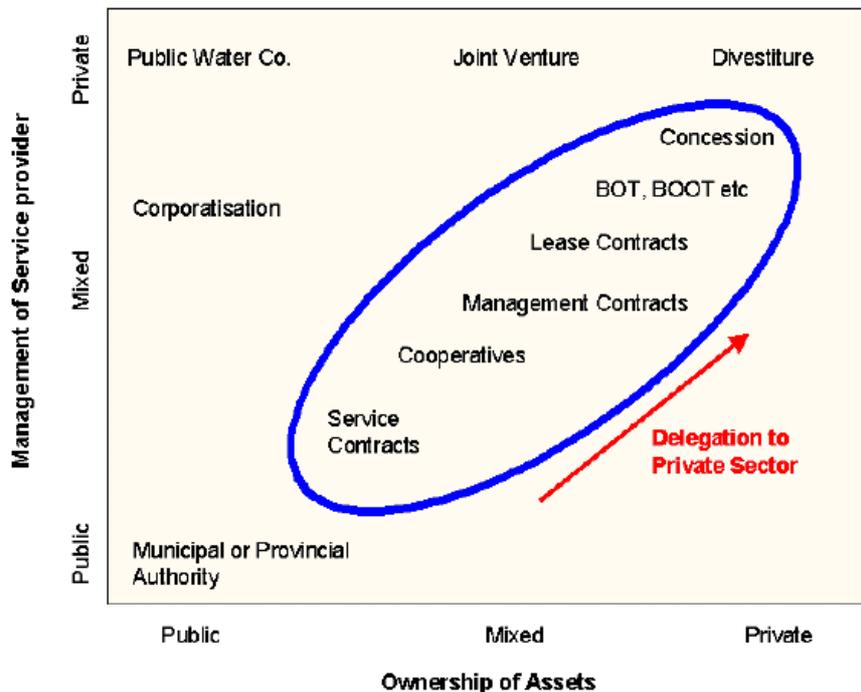


Table 4 Co-operation schemes for Public – Private Partnership²⁹

Levels of cooperation vary substantially. Service Contracts can be seen as a relatively limited co-operation of public and private sector. In a Service Contract public authority retains overall responsibility for operation and maintenance of the water supply system, and only contracts out specific components, such as meter reading, billing or maintenance. Service Contracts usually last 1 – 3 years. An example of much stronger involvement of the private sector are Concessions. In this case a private company takes over total responsibility for operation, maintenance and investment; however, ownership still rests with the public authority. Concessions are substantial in scope (usually a whole city or region) and tenders are usually for 25-30 years. As this example shows there are various ways of involving the private sector, without actually coming to a complete privatization. Only Divestiture is coming up with an entire involvement, which is equal, a privatization.

There is a continuous debate about the effects of private participation in the water supply. Nowadays, can be generally said that the fact if water supply is public or private does not condition its quality. However, as supply is a public good, two basic conditions should be met, before the decision about the involvement of private sector is taken: Firstly, access to steady water supply for total population, including the poor and secondly, the protection of the environment have to be assured.

Obviously, private investment is only possible, if certain requirements such as a legal framework, which provides credibility and security and the reduction of political risks (like in the case of Palestine) are met. The last 15 years experiences have shown that the introduction of private operators in a country with limited experience in this matter is a long and difficult process. Compared with other types of infrastructure, the water sector has been the least attractive one for private investors, and the sums involved are the smallest³⁰. One prove for the reluctance of private investment in the water sector in emerging markets is the small share of operators that are fully or partially

²⁹ See Earle 2001

³⁰ See The 3rd World Water Forum 2002

private in poor or emerging countries. In MENA the degree of privatization is less than 4 % what is very small in comparison to other regions of the world³¹.

e) **User and Stakeholder Participation**

A likely source of conflict lies between those that control and those that use water. Therefore, it is a high priority to devolve responsibility to water users. Crucial tool for this is to give users participation rights, or at least a voice in water supply organisations. Such stakeholder participation raises public acceptance of water supply reform actions as well as the accountability and transparency of the water utility operation. Transparency and accountability are also strong tools for raising the motivation and efficiency in water supply institutions themselves. Groups that are predestined for participation are women, farmers and NGOs. Particularly, the participation of farmers in the administration of irrigation networks brought good results in different regions of the world³².

Policy Module “Enhance of Water Infrastructure”

All water scarce regions of the world require strong water supply infrastructure particularly for water storage, transport and distribution. The initiation of those infrastructure projects is a traditional field of governmental water actions. Large-scale infrastructure projects however are increasingly criticized for their economical, social and environmental harmful effects³³. Still, the positive effects of well-designed water supply infrastructure are undeniable. Around the world, the countries vary greatly in their stock of hydraulic infrastructure with poor water scarce countries having the smallest share³⁴. It can be concluded that governmental infrastructure projects remain a main task for sustainable water policy, when being in accordance with following guidelines:

a) **Careful Enhance of Exploitation of Natural Water Sources**

In many arid regions of the world water supply has approached its natural limits, in other words; tapping of new sources results in impinging the demand of others or damaging eco-systems³⁵. Moreover, each new source of natural water in general causes more exploitation expenses than the previous one, mostly due to increasing transport cost. Still, particularly in remote areas additional storage and conveyor infrastructure can greatly relieve the water stress. Moreover, additional storage facilities and dams are a very important tool to prevent disasters like floods or droughts. Flood and drought management facilities are crucial in view of the global climate change, which is expected to bring more environmental disasters to the arid regions of the world. The planning and implementation of additional supply infrastructure must carefully be analysed for their impacts on the social and environment effects and impact on neighbouring regions – which must be carefully compared with alternative scenarios for water saving measures or the exploitation of non- conventional water sources. In some MENA regions purification of waste or brackish water is already today a more cost-effective option than enhanced exploitation of the remaining natural resources³⁶.

b) **Rehabilitation and Improvement of Water Distribution Systems**

The large water losses up to 50 % in the distribution systems are caused by insuffi-

³¹ In Latin America the share of private water supply is around 42 % (Earle 2001)

³² Successful pilot projects were implemented in Tunisia and Mexico.

³³ “Infrastructure for its own sake which are not compared with structural alternatives” are criticised by the World Bank in their Water Resources Sector Strategy (World Bank 2003)

³⁴ Australia has storage capacities of 5.000 m³/ capita, the Middle East in average 1000 m³ / capita (Camdessus 2003: 5)

³⁵ Tunisia will exploit more then 90 % of its natural renewable resources in the near future (Tonner 2000: 8)

³⁶ See Epp et al. 2002(?): 1144

cient distribution systems with obsolete technologies and very poor maintenance³⁷. In many places the refurbishment e.g. leakage prevention and reduction of water pressure holds strong saving potential. Covering open channels to closed pipes already are improving the system efficiency enormously³⁸. Therefore, the rehabilitation of the distribution system must be a top priority for governmental infrastructure programs.

c) Environmentally Sound Exploitation of Non-conventional Water Sources

Non-conventional water resources – wastewater, brackish water and saline water – are abundant in most arid regions of the world and also in MENA. An important policy tool therefore is the erection of wastewater treatment and desalination plants. Wastewater plants allow the recycling of water e.g. for irrigation purposes. Moreover, wastewater and sewage systems have positive effects on the protection of the natural water resources against contamination. Desalination is a widely used type of water supply in the oil producing Middle East countries. The steady drop of production cost makes desalination to an important supply option for the entire region in the near future³⁹. Desalination plants themselves contain environmental risks due to their large energy demand, land use and the need to discharge the brine. These environmental threats can be significantly reduced by advanced plant designs that for example base on renewable energy sources. Thus, governmental initiatives should strive to expand the exploitation of non – conventional water resources. This strive has to be accomplished with a drastic increase of the water distribution efficiency. Private Public Partnerships has to be evaluated for generating the necessary expertise and financial resources (see policy module “*Redesign of Institutional Framework*”).

d) Installation of Transparent Metering Systems

In many rural MENA regions, water metering is absent, or not done on an individual consumer level. As seen before this hinders any kind of effective pricing scheme. The installation of meters is a relatively cheap measure, which can bring fundamental changes in consumption patterns and awareness for water consumption and thus should be a political priority.

e) Restoration of Earlier Deterioration

Nowadays, water problems often result from unsustainable water supply schemes in the last decades. Deforestation, land degradation and aquifer deterioration have very negative impacts on today’s water supply options. Thus, restoration measures often are a prerequisite for the establishment of sustainable structures. Reforestation and sustainable forest management, the restoration of degraded meadows and wetlands and particularly groundwater recharge by artificial aquifer refilling are important infrastructure projects. All this, however need careful planning for being able to fulfil the expectations of easing the water crises in future.

Policy Module “Mobilizing Financial Resources”

It can be stated, that a large extent of today’s water crises in reality is a financial crises. Enormous financial resources are required to implement sustainable water supply structures in the arid regions of the world. Annually 180 billion US\$ are assessed to be necessary until 2025⁴⁰. The World Bank assumptions would mean to double the current total annual water investment in the developing countries. In respect to the weak public finances in all part of the world, it is difficult to mobilize these sums. Raising finances for water supply actions therefore has to be a priority in all governmental policies. Following actions should be part of the policy module “*mobilizing financial resources*”:

³⁷ See MedWater Report 3 2002: 8

³⁸ See MedWater Report 3 2002: 8

³⁹ Large scale desalination plants are able to produce fresh water with less than 0,65 US\$ per m³, (Strikker 2002: 47 – 55)

⁴⁰ See Briscoe1999

a) **Governmental Direct Subsidies**

Direct governmental subsidies are the most important money source for fresh water supply actions. Even with progressive water tariffs (see policy module “*Water Pricing schemes*”) many investments into water efficiency and non-conventional water supply are not economically feasible due to the need to remain water prices low. Thus, public subsidies are required. It is important that these subsidies are given out in small portions and in transparent and quick administrative processes. Moreover, the support programs must be large enough to create felleable effects. These subsidies can be generated to a certain extent result from reducing the annual deficits of water utilities (see policy initiative “*Water Pricing Schemes*”). The remaining parts must be covered out of general governmental budgets.

b) **Creating Favorable Conditions for Private Investment**

The path out of the world water crises can only be financed by combined private and public sources. Today, private sector funding is still less then 10 % of the total water supply finances⁴¹. Thus, it is a main objective for all governmental bodies to create an investor friendly environment. In most water supply projects the economic yield of the investment will be rather small. Next to public subsidies, private investors therefore require a high security for their investment. Investors need the confidence that their legal and financial interests are respected over the entire contract lifetime and that political risks are reduced. Public acceptance for PPP must be ensured. For safeguarding environmental and social concerns in the very sensitive field of fresh water supply, clear guidelines are to be developed for private investors. Public utilities should be given the right to find and define PPP themselves without governmental intervention. At the end of the day, a fundamental improvement of the entire technical and institutional setting-up of water supply will be the most important contribution for enhancing private investor confidence in the water supply market.

c) **Supporting Shareholder Investment**

Various projects have shown the willingness for commitment of end users to mobilize their own resources for improving their domestic water supply situation. It is the underprivileged that pay the highest water prices. Their despair results in various initiatives, which often are illegal and only bring short-term merits⁴². Additionally, there are various sectors of economically strong private entities e.g. hotel resorts that by them try to improve their unreliable and poor quality water supply. On the one hand governmental initiatives have to channel these local initiatives into environmentally and socially sound projects and on the other hand should also foster them for example by creating a favorable political surrounding by decentralization.

The commitment of consumer investment is hindered by the lack of access to small financial credits with acceptable conditions (micro financing). Governmental policies should also target to initiate micro financing schemes, which are set-up together with the development banks and commercial banks.

d) **Cooperation with International Development Banks and International Financial Institutions**

The Millennium Summit in 2002 has proved again that water is on the top of international policy agendas⁴³ what also raised the amount of aid funds available in this sector. Even when development aid will not be able to completely bridge the financial gap in the water sector, this sector can bring an important contribution by financing projects with strong multiplier potential. Therefore, government should search close

⁴¹ Global Water Partnership 2002: 76.

⁴² Examples are the privately operated RO plants in the Gaza strip or the privately dug wells around Damascus serving water for 1,3 million people in illegal settlements.

⁴³ The World Bank Group e.g. integrated water issues into the Poverty Reduction Strategy Papers (PRSP). Furthermore, in cooperation with the Water Resources Management Group (WRMG) they formulated Country Water Assistance Strategies (CWAS).

co-operation with the large development banks involved in the water sector for setting-up funding schemes for actions with high multiplier effects.

The general policies of the International Monetary Fund (IMF) and other financial institutions have strong impact on the ability of the indebted southern countries to lend money from the international financial markets and so – in spite of their household gaps – invest governmental money into the improvement of water supply. Thus, the national governments should strive to create a high awareness for the domestic water sector agendas between the international financial institutes like the IMF.

Policy Module “Public Dialogue and Capacity Building”

All policy initiatives require accompanying measures of awareness raising, capacity building and public dialogue. Without a certain level of understanding and acceptance for the urgent need of water sector reforms, all governmental policy initiatives are doomed to fail. The awareness still has to be raised between different parts of societies in MENA. Among many possibilities for public dialogue and capacity building, the most prominent are:

a) **Public Dialogue**

First, governmental aim must inform and educate broad public on the high value of water resources. Changes in attitudes and water consumption patterns reduce wasteful water consumption habits and so have strong water saving potentials. Special attention should be paid on integrating water related knowledge into school education. Furthermore, awareness building activities should be lanced and targeted at local population and also tourists. Examples for such activities could be presentations, exhibitions, posters or flyer distributions in rural and tourist areas. These awareness raising campaigns must be well designed and should positively highlight the chances of sustainable water supply structures.

b) **Training of Decision Makers**

Stakeholders and decision makers in all parts of society must gain a solid understanding for the principles of integrated water management focusing on the efficiency of water uses. It is very important to give incentives to the young elite and high potentials for starting and continuing their career in the water sector, as for example in desalination plants or in the educational sector. Basic incentives are competitive salaries and career possibilities. Another focus of training has to direct towards the agricultural sector, which gets more than 70 % of the overall MENA water supply. Improved information helps to increase farmers' awareness and appreciation for the water supply and consequently helps limiting waste water production.

c) **Strengthening the Domestic R & D Capacities**

Most MENA regions have a century old tradition in research and development work for coping with water scarcity. Based on this traditional knowledge policy programs should support effective research and development work domestically.

Universities and research agencies can best contribute to the alleviation of the water crisis in three major ways: First, by acquiring, analyzing and coordinating the primary data necessary for good empirical work; secondly, they can identify indicators of future water disputes and /or insecurity in regions most at risk; and thirdly, they have the resources for training of tomorrow's water managers in a integrated way⁴⁴.

Exchanging research knowledge with advanced institutes in EU, USA and Israel allows domestic scientists to peer latest research progress. The initiated transfer of knowledge should be done by joint ventures or concessional terms. This knowledge then should be adapted and further developed according to the on-site necessities by domestic research unities. First priority has to be set on demand side actions particu-

⁴⁴ See WOLF 2001

larly addressing the agricultural sector⁴⁵. On the supply side the focus should be on low-cost and robust solutions to enhance efficiency in decentralized supply structures. Close co-operation between water users, manufacturers and scientists will quickly bring research results into regional markets. An important role has to be overtaken by strong and committed water research and training centers on regional level⁴⁶.

Policy Module “International and Interregional Co-operation”

Water problems occur on regional and local level and consequently must be tackled according to these levels. International relations however have major impact on the local and regional water situation. River basins often span over several countries and therefore require international agreements on water take-outs and wastewater discharge. Furthermore, a water crisis can lead to an entire destabilization of a region, as in the case of the Aral Sea, which would have significant consequences for a bunch of even remote countries. Moreover, the world market prices for many agricultural products can only be reached by irrigating with very cheap and highly subsidized water. It was seen that irrigation water provision on such a cheap level is often only possible by exploiting the non – renewable groundwater sources. Using more expensive but renewable water sources means therefore to significantly endanger competitiveness of the own agricultural sector. Therefore, the waste of fresh water, particularly in the agricultural sector can only be reduced with a clear set-up in international agreements.

a) **Transparent and Balanced Agreements for the International Water Systems**

In international water basins water policies of every country have strong economic, social and environmental impacts on the neighboring regions. This is also the case for inland water systems and coastal areas that suffer from upstream water take-outs⁴⁷. These damages and the resulting conflicts can only be overcome by detailed sets of intergovernmental agreements between the riparian countries that are supervised by interregional water authorities that should be set-up under the auspices of the United Nations⁴⁸.

b) **Environmental Standards in incorporated into International Terms of Trade**

Two important regimes of international trade are relevant for MENA: The GATT agreements (General Agreements on Tariffs and Trade) and the Mediterranean Free Trade Zone. These agreements strive to enhance free trade by reducing monopolies and demolishing market penetration barriers. The Mediterranean Free Trade gives free access to the EU markets for winter grown agricultural products like citrus. It is necessary to integrate into these agreements a set of environmental standards that must be fulfilled by every free market participant. One important environmental standard has to be the criteria that the product was produced within sustainable water supply structures. All arid country governments should use their political weight for incorporating those regulations into the GATT and the Mediterranean Free Trade Zone.

c) **Enhanced Trade of Water Related Products**

The production of one ton of wheat requires approximately 5 tons of fresh water for irrigation. Thus, the import of certain water intense products into the arid regions of the world would create major water saving effects⁴⁹. However, it has to be recognized that

⁴⁵ Particularly the links between land and water use, has to be understood to a higher extent by research on water stress tolerant crop varieties and poor quality irrigation water use (Global Water Partnership 2002: 48)

⁴⁶ A positive example is the Middle East Regional Desalination Centre (MEDREC) in Oman

⁴⁷ The most alarming case in MENA is the Dead Sea, which is losing 40 cm in its water level each year (MedWater Report 2 2002: Executive Summary)

⁴⁸ See Catley-Carson 2001

⁴⁹ FAO assesses that by virtual water trade real water savings on global scale in the frame of 385 000 MCM would be possible

that agricultural production in arid regions can only be reduced, if the residents succeed in building their economic survival on other, less water-consuming basis. Thus, enhanced trade of water intense products has to be coupled with decisive restructure aid programs in arid regions.

d) **Supportive Framework Conditions for Emerging Economies**

A basic reason for unsustainable water supply structures in many arid regions of the world is their pressing poverty⁵⁰. Therefore all governments should strive to set-up a financial and economic regime, which supports the developing countries to find paths out of their poverty traps. This is particularly the case for agricultural products which market penetration is hindered by Northern Hemisphere market protectionism. Moreover, debt relieve programs are precondition for any kind of economic stabilization of southern countries. This in direct consequence will grow the strengths of all domestic parts of society to reform unsustainable water structures and so combat the looming water crises.

⁵⁰ For a broad understanding of poverty as an individual, institutional and economical deficit, see Abrams 1999

Summary

All tools for sustainable water supply management for coping with water conflicts between agriculture and tourism can be summarized in the following table:

Field of Action	Water Supply		Water Demand	
	Conventional	Non conventional	Agriculture	Tourism
Policy Module				
Legislative Framework	Permission for Groundwater Exploitation	Environmental Standards	Restriction of Water Intense Agricultural Cultivation	Restriction of Water Intense Infrastructure
	Water Quality Standards		Efficient and Environmentally Sound Irrigation Systems	Water Saving Architecture e.g. Rain-storage
				Pollution Prevention
Water Pricing Schemes	Consumer Group Targeted Progressive Taxation			
	Reduced Subventions for Water Supply Utilities			
	Adaptation of General Subsidies			
Institutional Framework	Decentralized and Interlinked Water Authorities and Supply Facilities			
	Enhanced Cross Sector Administration Co-operation			
	Installation of Strong Control Entities			
	Water Supply Liberalization and Public Private Partnership			
	User and Stakeholder Participation			
Water Infrastructure	Careful Enhance of Exploitation of Natural Resources	Environmentally Sound Exploitation of Non Conventional Water Resources	Installation of Transparent Metering Systems	
	Rehabilitation and Improvement of Water Distribution Systems			
	Restoration of Earlier Deterioration			
Mobilizing of financial resources	Governmental Direct Subsidies			
	Creation of Favorable Conditions for Private Investment			
	Supporting Stakeholder Investment			
	Co-operation with International Development Banks and International Financial Institutions			
Public Actions and Capacity building	Public Dialogue			
	Training of Decision Makers			
	Strengthening the Domestic R & D Capacities			
International and inter-regional co-operation	Transparent and Balanced Agreements for the International Water Systems			
	Environmental Standards Incorporated into International Terms of Trade			
	Enhanced Trade of Water Related Products			
	Supportive Framework Conditions for Emerging Economies			

Table 5 Summary of MedWater Policy Modules

The survey has clearly shown that individual and separated water supply reform actions have little likelihood of success. Most actions only find strength and feasibility when backed-up by additional accompanying measures. This highlights the necessity to incorporate all these

actions into an integrated water resource management (IWRM). All IWRM is based on the formulation of integrated cross-sectoral water management plans⁵¹.

Moreover, it became clear that there are many different tools and instruments to adopt IWRM requiring a variety of tools and actions. Still, it can be stated that every IWRM must find actions in all water modules listed above. The selection of appropriate actions in every policy module has to base on social, economic and environmental peculiarities of the specific region. Adopting the Policy Modules to the situation in the five MedWater target regions can highlight this need for an individual set-up.

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⁵¹ The World Water Forum in Kyoto in 2003 agreed to adopt Integrated Water Plans world-wide.

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