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**High Level Briefing Session on the Application of IWRM  
in the ESCWA Region  
13 September 2004  
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**ENHANCING THE APPLICATION OF  
INTEGRATED WATER RESOURCES MANAGEMENT IN THE  
ESCWA REGION**

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## ***Executive Summary***

Integrated Water Resources Management (IWRM) is a framework for the sustainable development and management of water resources for the whole society. IWRM plays a key role in social and economic development, particularly in sustainable development and poverty alleviation. The United Nations Economic and Social Commission for Western Asia (ESCWA), in coordination with a range of stakeholders, is implementing a programme for regional and national capacity building in IWRM.

At the core of this initiative is the preparation of an ESCWA Region Training Manual which provides the basis for developing a regional training and capacity building program that promotes the concepts and applications of IWRM at basin, national and regional levels. The Material in the ESCWA Region Training Manual can then be customized to address the training and information needs of different types of stakeholders in the ESCWA region. This report thus gives an overview of the ESCWA Region Training Manual that will be published at the end of 2004 and introduces the next phase of the programme for national implementation.

The ESCWA Region Training Manual follows the structure of the Global Water Partnership IWRM ToolBox, with regional adaptations from the ESCWA region by regional experts. It covers three main sections: **Water Governance** (Policy, laws, institutions, stakeholders and capacity building) **Water Uses** (Agriculture, water supply and sanitation and the environment) and **Water Management Tools** (planning, analysis, groundwater, economics, paying for water, raising awareness, etc.).

The second phase of the programme is for implementation by national water agencies and their partner stakeholders working with the environment and agriculture. Using the ESCWA Region Training Manual, ESCWA plans to customize the manual to different groups of stakeholders at the regional and national levels. Representatives from member countries are now invited to comment on this initiative and subsequently to prepare, develop and operationalize their national plans for implementing IWRM capacity building.

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INTEGRATED WATER RESOURCES MANAGEMENT IN THE ESCWA REGION**

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# **1- Introduction**

## **The development process**

This overview report introduces the process of Integrated Water Resources Management (IWRM) to senior policy and decision makers with the aim of mobilizing political and decision support to implement IWRM at the basin, national and regional levels. In 2004 ESCWA's capacity building program for IWRM has reached an important milestone and member countries are invited to review progress achieved to date and support the ongoing program. This report outlines the water crisis in the ESCWA region – the issues of food self-sufficiency, population growth, urbanisation; financing water infrastructure and shared water resources. It discusses “What is IWRM?” – its rationale and principles; and it gives an overview of the ESCWA Region Training Manual.

It is recommended that later stages of the program are adopted, adapted and implemented by member countries. Effective national implementation of IWRM will have a profound impact on the governance of water, water users and the natural environment. There will also be important socio-economic benefits that will assist ESCWA member countries to meet the major development challenges they face. Introducing IWRM is a long term and wide ranging program that some member countries have already started. This capacity building programme will assist member countries in developing a strategic approach to developing and managing water to benefit civil society as a whole through the application of the IWRM approach.

Water resources management in the ESCWA region represent a priority issue given natural water scarcity and increasing water demand for different development activities. In order to support its member states in addressing water scarcity, ESCWA in its Medium Term Plan (2000-2005) and 2004-2005 programmed activities has focused on capacity building for application of IWRM as one of its priority areas. To this end, it implements studies, develops guidelines and organises expert group meetings and training workshops. These activities strive to increase awareness of the gravity of water issues. They also alert decision-makers and

water professionals, various segments of society, the non-governmental and private sector to the fact that there is a need to prioritise the application of IWRM at the local, national and regional levels. ESCWA's strategy for delivering the capacity building process comprises three outputs delivered during two stages.

The IWRM capacity building program has three main outputs: this introductory report, ESCWA Region Training Manual and support for national IWRM programmes that includes a series of national and sub-regional training workshops. The programme is also complemented by monitoring progress made by member countries and supporting their initiatives in developing national strategies on IWRM by 2005 as stipulated in the Johannesburg Plan of Action.

The Stage 1 process of developing the Capacity Building Initiative on IWRM for the ESCWA Region began in June 2003 at the Training of Trainers (ToT) Workshop, in Neuchatel, Switzerland, organized by CAP-NET<sup>1</sup> in support of regional initiatives on IWRM. The aim of the workshop was to provide experts from different regions with a basic training package, which in turn should be developed and customized to their respective region. Consequently the outline contents of the ESCWA Region Training Manual was developed by building on the Global Water Partnership IWRM ToolBox and using training material provided by CAP-NET. Two water experts from Bahrain and Palestine, who are members of AWARENET<sup>2</sup>, were commissioned to prepare in collaboration with ESCWA staff a first draft of some 16 modules, with additional inputs from ESCWA staff.

The first draft of the ESCWA Region Training Manual was reviewed at an Expert Group Meeting (EGM) in Beirut during March 2004.

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<sup>1</sup> A Capacity Building Network on IWRM Project funded by UNDP, the World Bank and Global Water Partnership

<sup>2</sup> Arab Integrated Water Resources Management Network

Using the EGM recommendations this report (Output 2) was prepared to provide a synthesis of themes and issues addressed in the ESCWA Region Training Manual. It is geared for high level decision makers and it will be presented at the “ High Level Briefing Session on the application IWRM in the ESCWA region” to be held in September 2004<sup>3</sup>.

The Stage II process, national implementation, needs to be further discussed and planned. A national IWRM strategy (Output 3) will need to be developed and agreed through wide-ranging consultations between several government departments and water agencies. It is recommended that national implementation of the capacity building program begins not later than mid 2005 and initially extends over 1 – 2 years.

### ***IWRM Capacity Building program: Stage I – The Regional Process***

1. Initiate the program: Global Training of Trainers workshop, Neuchatel/Switzerland.
2. Prepare first draft of the ESCWA Region Training Manual (Output 1).
3. Review by ESCWA.
4. First draft peer review in Expert Group Meeting.
5. Prepare overview report (Output 2).
6. High Level Briefing Session on the Application of IWRM in the ESCWA Region.
7. Final edit of the ESCWA Region Training Manual (Output 1).
8. Regional workshop for technical personnel in related ministries.

#### **Output 1 - Regional IWRM Training Manual**

**Audience:** Managers, professionals, academics and trainers from member states  
**Purpose:** To provide a regional syllabus and manual on IWRM for training of trainers  
**Contents:** 16 modules covering IWRM principles, water uses and management tools

**Audience:** National ministers and high level policy makers in water related agencies; UN regional agencies; other partners to ESCWA.  
**Purpose:**

- Highlight issues of relation to IWRM and of concern to the region.
- To brief on the relevance and priority for introducing the IWRM Capacity Building Initiative in the ESCWA region.
- To strengthen national initiatives in implementing IWRM capacity building programmes.

**Contents:**

- The challenges of water management in the ESCWA region – food, security, population growth, urbanisation, financing infrastructure, shared water resources management.
- What is IWRM? – Rationale and principles.
- Overview of the ESCWA Region Training Manual prepared by ESCWA for its member countries.

#### **Output 3 - National IWRM Strategies and Manual**

**Audience:** Local water authorities, water services, environment and agriculture ministries and associated organisations: Training and research institutes, university staff and students, Civil Society actors.  
**Purpose:** Basic training in IWRM given by national trainers, using national manual.  
**Contents:** Same as the ESCWA Region Training Manual, but with local adaptation, assisted by ESCWA and in collaboration with stakeholders.

<sup>3</sup> Special thanks to Mr. Peter Herbertson who has taken an active part in discussing the regional IWRM Capacity Building Initiative and in preparing his report.

## ***IWRM Capacity Building program: Stage II – National Implementation***

1. Customize the ESCWA Region Training Manual and organize regional training workshops.
2. National training workshops by country invitation.
3. Adapt the ESCWA Region Training Manual for national use (Output 3).
4. Local and basin level training using the ESCWA Region Training Manual.
5. Use the ESCWA Region Training Manual in government seminars, workplace short courses and university courses.

## ***The ESCWA Region Training Manual***

The ESCWA Region Training Manual is key to the IWRM capacity building process being promoted by ESCWA. The principles of IWRM have evolved over several decades, starting in developed countries like UK, France, Australia and USA and adopted by Agenda 21 Chapter 18 and Johannesburg Summit Declaration. Increasingly IWRM is being adopted in developing countries like South Africa, India and China. The international framework for IWRM, as defined by the Global Water Partnership (GWP), is being adapted to suit local conditions in different parts of the world. GWP have published an international manual “Integrated Water Resources Management ToolBox: Sharing Knowledge for Equitable,

Efficient and Sustainable Water Resources Management” (2003). This report is also available on the web ([www.gwpforum.org](http://www.gwpforum.org)) and has been used as the starting point for the ESCWA Region Training Manual, which broadly follows the GWP structure.

This report on “Enhancing the Application of Integrated Water Resources Management in the ESCWA region” follows the thematic structure of the ESCWA Region Training Manual:

Part A, **Water Governance** describes the enabling environment and institutional roles for managing water.

Part B, **Water Uses** describes the way water is used for food, people and the environment.

Part C, **Water Management Tools** are the techniques needed to manage water efficiently.

This structure combines two of the main components described by GWP in section 2 below, Enabling Environment and Institutional Roles, and introduces a new part on water uses. Part C on Water Management Tools follows the GWP ToolBox closely.

The full outline of the ESCWA Region Training Manual is shown in the box below. The key emphasis is on governance, which is an important issue across the Arab region in addition to the management of groundwater, agriculture and shared water resources.

# **OUTLINE OF THE ESCWA REGIONAL TRAINING MANUAL ON IWRM**

**INTRODUCTION - What is IWRM? Why is it needed in the ESCWA region?**

## **PART A - WATER GOVERNANCE**

- A1. AN ENABLING ENVIRONMENT - Integrating policy
- A2. WATER LEGISLATION - Legal framework to set the stage for the implementation of policy
- A3. WATER INSTITUTIONS AND BUILDING CAPACITY - Forms and functions for organisational frameworks
- A4. STAKEHOLDER PARTICIPATION AND GENDER ISSUES - Giving people a voice in water affairs including planning and management
- A5. FINANCING STRUCTURES - Financial resources to meet water needs

## **PART B - WATER USES**

- B1. FOOD, AGRICULTURE AND IRRIGATION - Food security and irrigation efficiency
- B2. DRINKING WATER AND SANITATION SERVICES - Urban, rural and industrial water services
- B3. ENVIRONMENT - Protecting the environment from pollution and degradation, ecological component in water allocation and management

## **PART C - WATER MANAGEMENT TOOLS**

- C1. INTEGRATED BASIN PLANNING AND MANAGEMENT - Combining development options, resource use and human interaction
- C2. WATER RESOURCES ASSESSMENT - Understanding resources and needs
- C3. MANAGING GROUNDWATER - Sustainable development and protection
- C4. DEMAND MANAGEMENT - Managing demand and supply by using water more efficiently
- C5. VALUE OF WATER - Water has an economic value for better efficiency and equity
- C6. USING REGULATIONS - Water allocation, enforcing water use limits and policing pollution
- C7. MANAGING SHARED RESOURCES - Managing disputes, ensuring sharing of water
- C8. PROMOTING AWARENESS AND EDUCATION - Encouraging a water-oriented society

## **2-What is IWRM?**

### **Definition of IWRM**

Integrated Water Resources Management as defined by GWP is a process, which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner and without compromising the sustainability of vital ecosystems”.

### **The need for IWRM**

The key to encouraging an IWRM-oriented civil society lies in the creation of shared visions, through joint diagnosis, joint creation of options, joint implementation, and joint monitoring. Capacity Building programs help consolidate this shared vision and present effective tools for sharing and using relevant knowledge in the field. Knowledge of sustainable development and IWRM concepts can empower water practitioners and researchers as well as decision makers and planners. This strengthens good governance in the water sector.

Rapid population growth and urbanization, growing dependence on food imports and the expansion of development and economic activities in the region are all exerting huge pressures on scarce water resources. The need to adopt an integrated approach to the management of water resources is becoming a major concern throughout the ESCWA countries. The galloping rise in demand associated with increased water use and wastage is more serious because available renewable resources are already overdeveloped. Pollution further exacerbates water scarcity by contaminating surface and groundwater and reducing water usability downstream.

As pressures on water converge on the region’s water resources, the need for innovative approaches in water management becomes more apparent and quite urgent. The international community has recognized this fact, and over the past decade a consensus had been formed on integrated water resources management (IWRM) as an appropriate approach to address threats posed

to water resources. Within the framework of sustainable management of water resources, IWRM takes into account a broad spectrum of social, economic, and ecological factors and their links. Effective coordination and participatory decision-making process are insured throughout IWRM. IWRM process depends on collaboration and partnerships at all levels, from individual citizens to international organizations, based on a political commitment to, and wider societal awareness of the need for water security and the sustainable management of water resources.

### **Guiding principles from The Dublin conference**

The UN Conference on Environment and Development, in Rio de Janeiro, 1992, was attended by 172 national governments, including many ESCWA member countries. The conference endorsed the report of the Conference on Water and the Environment, held in Dublin in January 1992. The “Dublin Principles” have played an important role in stimulating reforms in water management and play a central role in IWRM. The Conference Report sets recommendations for action at local, national, and international levels based on the following four guiding principles with many associated key concepts:

- Fresh water is a finite and vulnerable resource, essential to sustain life, development, and the environment.
- Water development and management should be based on a participatory approach, involving users, planners, and policy makers at all levels.
- Women play a central part in the provision, management, and safeguarding of water.
- Water has an economic value in all its competing uses and should be recognized as an economic good.

### **How to implement IWRM?**

The GWP has published a definitive paper on the framework for IWRM (2000) and in 2003 it launched its IWRM ToolBox. This is a compendium of over 50 policies, actions and tools for putting IWRM into practice. There is also a

growing collection of case studies illustrating practical real-world use of IWRM tools. These can be downloaded from the Internet [www.gwp.forum.org](http://www.gwp.forum.org).

The three main components of IWRM are described by GWP as:

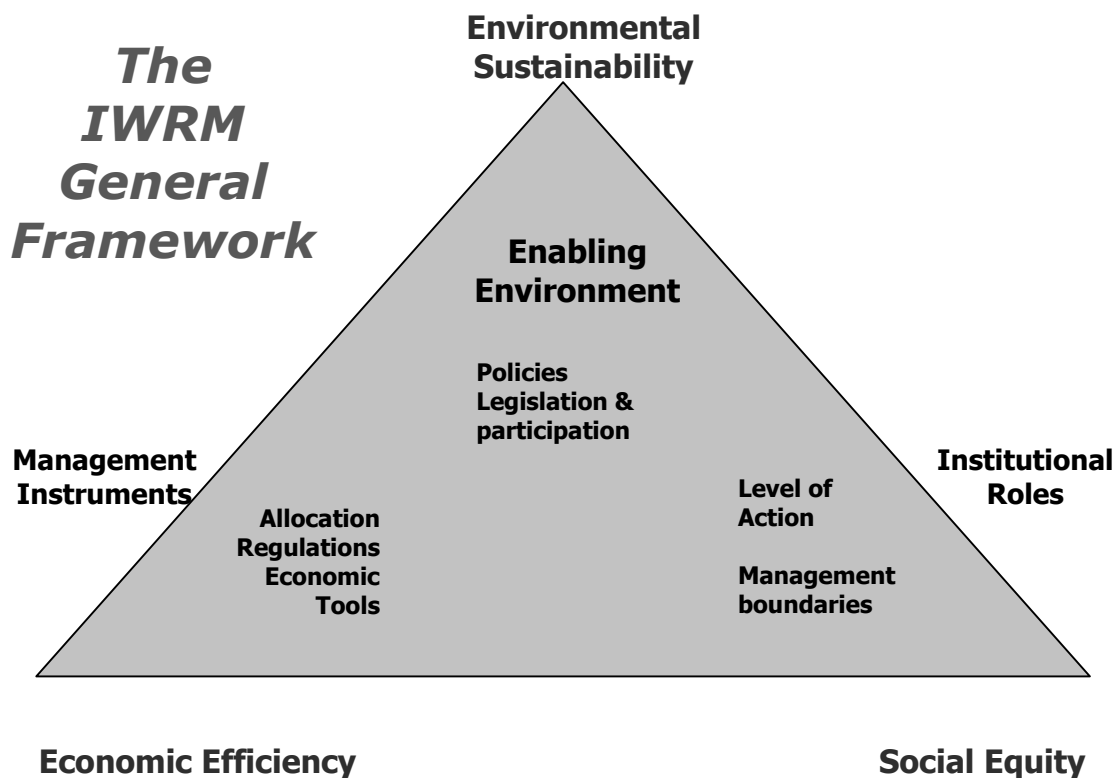
1. **The Enabling Environment:** the general framework of national policies, legislation and regulations and information for water resources management stakeholders.
2. **The Institutional Roles** and functions of the various administrative levels and stakeholders.
3. **The Management Instruments and Tools** including operational instruments for effective regulation, monitoring and enforcement that enable the decision-makers to make informed choices between alternative actions. The IWRM framework is shown below.

The three “E Pillars” that support the framework are Social **Equity**, Sustainable **Environment** and Economic **Efficiency**

1. **Social Equity:** The basic right for all people to have access to water of adequate quantity and quality for the sustenance of human well-being.

2. **Sustainable Environment:** The present use of water resources should be managed in such a way that does not undermine the life support system, thereby compromising use of the same resource by future generations.

3. **Economic Efficiency:** Because of the increasing scarcity of water and financial resources, the finite and vulnerable nature of water as a resource and the demands on it, water must be used with maximum possible efficiency.



### 3 Why IWRM in the ESCWA Region?

ESCWA has recognized several reasons for poor implementation of IWRM concepts in the region. These include: lack of awareness and public funds, fragmented water related institutional infrastructure, absence of comprehensive national water policies, outdated legislation, deterioration of water quality, inconsistency in water resources data, the insufficiency of basic data and the demand for water is irrationally high. Poor implementation of IWRM is the major challenge for the water sector in the water scarce ESCWA region. There is a lack of coordinated development and management of water, land and related resources and as a result, economic and social welfare is not being maximized and the environment is being degraded.

Natural water scarcity is combined with unsustainable use, population growth, food security and financial constraints. There is a crisis of water governance in the region, which can only be addressed through IWRM.

#### Water scarcity

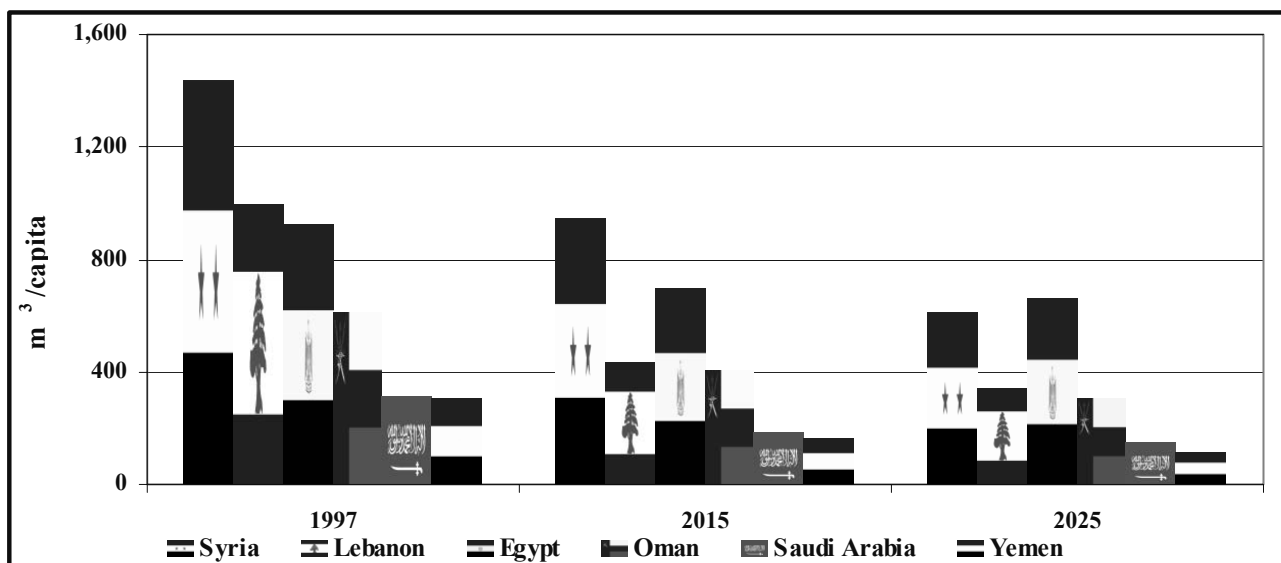
The ESCWA region has always experienced low natural water availability, especially in those countries in arid or extremely arid climatic zones. However, the rapid population growth, unsustainable water use and increase in pollution levels is contributing to the extreme water scarcity of the region.

The degree of water scarcity can be assessed using the Water Barrier Index (WBI), which estimates annual renewable water available per person to define categories of increasing water stress.

m <sup>3</sup> /Capita	Stress level / Country
3,000 – 1,700	Iraq
1,700 - 1,000	<b>Water stress situation</b> Syria
1,000 - 500	<b>Severe water scarcity</b> Lebanon, Egypt, Oman
500 - 200	<b>Critical water scarcity</b> Saudi Arabia, Yemen, Palestine
< 200	<b>Acute scarcity</b> Bahrain, Jordan, UAE, Qatar, Kuwait

*Table 1: Water stress in selected countries (ESCWA, 2003)*

These figures for water scarcity become even more alarming in the future when long-term population growth is taken into account, as the chart below shows in m<sup>3</sup>/head for three time horizons. By 2015, the year of the Millennium Development Goals, only Iraq remains just above the water stress category, but most other countries have moved down to an even more severe level of water scarcity.



*Figure 1: Future water stress in selected countries (ESCWA, 2003)*

## **Unsustainable use**

The development of groundwater use over the last thirty years has led to completely unsustainable withdrawals. ESCWA (2003) has reported that in 1996 groundwater withdrawals were *twice* the safe yield of aquifers in Bahrain, Jordan, and Yemen; *three* times safe yield in Kuwait, Qatar; *four* times in Saudi Arabia and *seven* times in the United Arab Emirates

## **Deteriorating water quality**

The quality of both surface and groundwater resources in the ESCWA region is being affected by development activities and water use practices in all member countries. Deterioration of water quality is due in part to:

- Increased discharge of untreated domestic sewage, industrial wastewater and saline drainage water;
- Discharges from agro-processing plants, fertilisers and pesticides;
- Discharges of hazardous and toxic industrial waste;
- Over exploitation of aquifers leading to saline intrusion.

In the Nile Delta, drainage contaminated with agro-chemicals is affecting both surface water and shallow groundwater. Use of water from the Euphrates for irrigation has resulted in loss of dilution for downstream discharges and the river is further polluted by returned drainage water.

## **Population growth**

Historic and forecast data over the 40-year period 1980 to 2020 indicates an alarming population increase in the ESCWA region. This is a far higher growth rate than in other countries such as India, where populations have doubled over the same period. This population data has great significance for water demand forecasting and reinforces the urgent need to manage demand as well as develop new supplies.

## **Urbanisation**

As in most developing countries, not only are populations growing, but also they are moving away from rural areas into the towns. This places

additional pressures on urban water services and at the same time reduces the number of people engaged in agriculture and irrigation management. Rates of urbanisation are particularly high in Oman, Saudi Arabia, Yemen and Kuwait where the average annual rate of change of the urban population in these countries between 1995 and 2000 were 3.92, 3.88, 4.44 and 5.73 respectively.

## **Food security**

Development of groundwater resources has resulted from government policies offering crop subsidies. This is driven by the strategic desire to increase food security by growing as much food as possible locally. The Food and Agriculture Organization of the United Nations (FAO) rates on food self-sufficiency (local food production / total food demand) for selected ESCWA countries are shown in section B1. Countries with the lowest food production rates will experience the greatest ongoing pressure on water resources. Countries producing less than 60% of its food needs include: Iraq, Jordan, Saudi Arabia and Yemen. Countries producing between 60 and 80% of its needs include: Egypt, Lebanon and Syria. No countries in the region are self-sufficient in food needs.

		2000	2020
	m	m	m
<b>Bahrain</b>	0.34	0.68	0.97
<b>Egypt</b>	43.9	67.8	96.9
	13.0	23.3	38
<b>Jordan</b>	2.23	5.0	7.56
<b>Kuwait</b>	1.4	2.5	3.7
<b>Lebanon</b>	2.7	3.5	4.4
<b>Oman</b>	1.2	2.6	4.4
<b>Qatar</b>	0.23	0.58	0.75
<b>Saudi Arabia</b>	9.6	21.1	36.3
<b>Syria</b>	8.9	16.7	25.1
	1.0	2.8	3.8
<b>Palestine</b>	1.5	3.2	6.1
	8.1	18.0	36.5
<b>Total</b>	<b>94.1</b>	<b>167.76</b>	<b>264.48</b>

*Table 2: 40-year population growth in millions (UN, 2003)*

**Financial constraints**

Financial resources differ markedly between the largely self-sufficient oil producing Gulf Cooperation Council (GCC) states (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and UAE) and other member countries that have to rely on foreign loans or grants. External financing often has strings attached, which may include application of particular economic or management principles in water development and management.

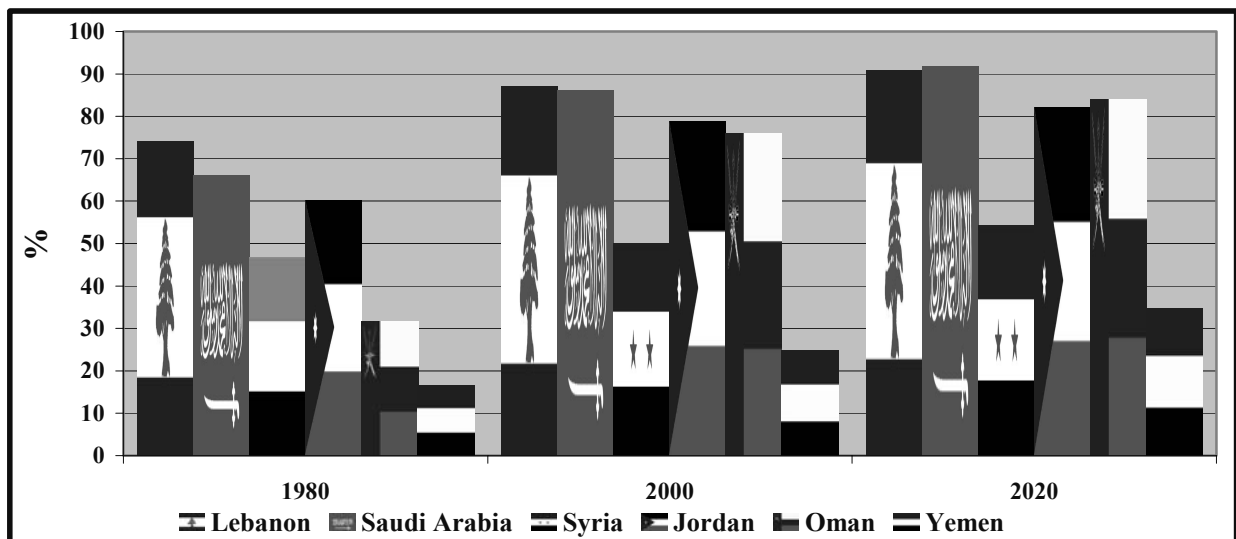
For example the World Bank has been promoting irrigation development, IWRM and demand management in the region for the last decade. The World Bank has allocated 79% of its total loans to the region to finance irrigation projects.

Investment in the water sector can represent significant proportions of national budgets. Jordan’s investment in water projects 1976-90 accounted for around 12% of the annual budget. In GCC counties considerable investment has been directed towards seawater desalination. The economics of desalination is distorted by the low local energy costs.

Private investment in water projects is very limited, with one exception being the Toushka project in the Western Desert of Egypt which aims to cultivate 0.61 million hectares, with associated urban and rural development, industry and tourism. The project infrastructure is being financed through government spending; regional and international private investment will cover the investment phases, with the emphasis on agricultural development (ESCWA, 2003).

Constraints in governmental budgets in most ESCWA member countries restricts the development of their drinking water and sanitation infrastructures to meet the demands for water and sanitation services associated with the increase in population growth and urbanization. Furthermore, governments are unable to allocate the necessary budgets to finance the maintenance of existing networks that are deteriorating.

Investment in local organisational capacity building for managers and technical staff is very limited. As a result operational management, maintenance and administration of all water services lacks the capability to meet the major challenges facing the water sector.



*Figure 2: Percentage of population in towns in selected countries (UN, 2004)*

**Water poverty**

The purpose of the Water Poverty Index is to express an interdisciplinary measure which links household welfare with water availability and indicates the degree to which water scarcity impacts on human populations. This index makes

it possible to rank countries and communities taking into account both physical and socio-economic factors. This enables international organisations to monitor both the resources available and the socio-economic factors that impact on access and use of these resources. The index measures available resources, access,

capacity, use and environment. These published data show Yemen and Jordan to be lower than other ESCWA countries.

### ***A crisis of governance: The AHDR points the way***

When presenting to the public The Arab Human Development Report (AHDR) 2002, the United Nations Development Programme (UNDP) representative asked: “What public policies, incentives and practices will help us to develop not just our infrastructure, economies and resources, but more centrally the full capabilities of our people, and new opportunities for them and future generations?” *One answer is IWRM.*

She pointed out that “Over the past two decades, growth in per capita income was the lowest in the world apart from sub-Saharan Africa.” The AHDR underlines the importance of investing in people and their talents. *So does IWRM.*

The Report illustrates that true human development requires systems of good governance that promote, support, and sustain human well-being by expanding capabilities, choices, opportunities and a whole range of freedoms – economic and social as well as, political, particularly for the poor and marginalized. *Good governance is the key to effective IWRM.*

The Report is clear that the legitimacy and strength of states and their institutions are inextricably linked to their capacity to mobilize and be mobilized in the fight against poverty. The basic priority for policy in Arab countries is to create a virtuous cycle whereby economic growth promotes human development and human development in turn promotes economic growth. *Integrated water resources management can aid delivery of this virtuous cycle.*

### ***The virtuous water cycle***

The water sector – its users, managers, policy makers, and its social and natural environment – is essential to almost every aspect of human development. Water is essential for life and food; clean water and sanitation cuts disease; community participation in managing water and sanitation services develops local human resources; capacity building in water service personnel improves efficiency, cuts waste, improves availability and postpones infrastructure investment.

Water service maintenance and development provides new economic activity with immediate and direct social benefit; Good water resources management protects the environment and is sustainable. Investment in better management can lead to improve cost recovery in paying for water services, which in turn can pay for future maintenance of services and their sustainability.

Country/area	WPI
Finland (Top)	78.0
Bahrain	56.1
Egypt	58.0
Iraq	n/a
Jordan	46.3
Kuwait	53.5
Lebanon	55.8
Oman	59.4
Qatar	57.2
Saudi Arabia	52.6
	55.2
	52.0
	43.8
Niger (Bottom)	35.2

***Table 3: Water Poverty Index (WPI) for Selected Countries (Sullivan, 2002)***

## **4- PART A WATER GOVERNANCE**

Improving water governance is at the heart of IWRM. Whilst senior water professionals and managers need to understand and communicate the issues, responsibility for action lies with government ministers, policy makers, politicians and community leaders. The following modules detailed in the ESCWA Region Training Manual should be read and discussed by a wide section of the community.

### **A1. AN ENABLING ENVIRONMENT**

#### **Integrating policy**

Appropriate national and regional policies are the foundation for effective IWRM application. Policy development gives an opportunity for setting national objectives for managing water resources and water services delivery within a framework of overall development objectives.

### **A2. WATER LEGISLATION**

#### **Legal framework to set the stage for the implementation of policy**

Water law covers the use of water, the permits to use (or pollute) it, the transferability of these permits, and entitlements or norms for conservation, protection and priority uses.

### **A3. WATER INSTITUTIONS AND BUILDING CAPACITY**

#### **Forms and functions for organisational frameworks**

Institutional reform is needed to aid better water governance - from international organisations and agreements addressing international waters, basin management, organisations and regulatory bodies, to local authorities, civil society organisations and partnerships.

### **A4. STAKEHOLDER PARTICIPATION AND GENDER ISSUES**

#### **Giving people a voice in water affairs including planning and management**

Stakeholders' involvement is an integral part of good water governance, both as partners in delivery of services and as water using beneficiaries. Women have an important role as water users and stakeholders. The public has an important role in monitoring and reporting and enforcing the water regulations and legislation.

### **A5. FINANCING STRUCTURES**

#### **Financial resources to meet water needs**

and many countries have major backlogs in developing water supply and sanitation infrastructures.

# **A1. AN ENABLING ENVIRONMENT**

## **Integrating policies**

### **Rationale**

In a region of scarce water resources, water management is in crisis. But there is worldwide recognition that water problems cannot be solved by the water sector on its own. Better water governance is needed to address the growing challenges facing water resources management. It will require daring and difficult changes to existing policies, laws and institutions governing water resources. Positive and effective change can be achieved if the policy makers engage the stakeholders in a process of participation, from the earliest consultation to implementing new laws.

Far reaching and multi-sectoral approaches will be necessary if we are to overcome inefficient and wasteful use. This will require the establishment of an effective enabling environment to ensure the rights of users and provide the appropriate level of protection for the resource. New policies, legislation, establishment of governing bodies at various levels and knowledge management are all essential to meet the objectives of IWRM and to build the capacity of institutions and human resources.

### **Objectives**

1. To provide a broad overview of the enabling environment for policy, legal, and institutional frameworks for IWRM.
2. To introduce the key elements of IWRM policy and engage people from different backgrounds in a shared approach to water management.
3. To alert water professionals to the contribution they can make to the political and social processes governing water management and development.

### **Issues**

- How relevant is the IWRM approach for the formulation and implementation of water policies in your country?
- Is the need for better water governance agreed by all stakeholders in IWRM?

- How is political commitment to IWRM obtained? Who wants reform? Who are the champions (e.g., a minister)?
- What are the trade-offs in terms of costs and benefits for developing participatory approaches to policy formulation and implementation?
- Do the current institutions for legislation and public information support the planning and implementation of IWRM?

### **An Enabling Environment**

IWRM is a *process* (not an end product!) to reach sustainable development of natural resources and it promotes the coordinated development and management of water, and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystem. An enabling environment of politics, policy, laws, institutions and information is needed to facilitate the IWRM approach in any country or river basin. The enabling framework consists of a *constitutional function* (establishing laws and policies), an *organizational function* (water resources management of the country or river basin), and an *operational function* (water services, uses, and users).

**Politics** are not often highlighted in IWRM discussions; it is critical that there should be political commitment and champions to promote the adoption of IWRM principles and practices. Allocating a finite resource among multiple users triggers the interplay of social values, people's aspirations, and competing claims. This underlines the importance of politics in implementing the IWRM approach. Water professionals should be able to inform and support the political process.

**Policies** for the use of water resources have to translate into choices for planning, allocation, and management. Policy formulation is a core government role. These policies should point in the direction of achieving IWRM in the country or basin, over the long and medium term, by:

- Linking water resources policy with overall social and economic development;
- Offering a framework for managing water resources at the appropriate level;

- Coordinating appropriate inter-sectoral linkages; and
- Providing a basis for stakeholders' participation and action.

**Laws and regulations** reflect social and policy choices with respect to IWRM. They provide a legal basis or compact for policy and program implementation, including legitimacy for stakeholders institutions and their actions; water rights; principles of water use, financing, resources management, protection, monitoring and enforcement.

**Institutions** describe rules and organizational arrangements. Rules define stakeholders' roles and relationships in planning and management, specifically in water development, bulk water management, financing of investment and operation, and water distribution and services.

**Information and participation** are usually supporting tools in planning for integrated resource management (analysis of data on water availability and demand, land use, economic and social values, etc.). More importantly, they also offer a means of engaging stakeholders in a dialogue on policies.

### **Current policies and practices in the ESCWA region**

ESCWA countries have adopted varied approaches to national water sector reform, reflecting their socio-economic conditions and their legal and administrative systems. However, a general consensus is beginning to emerge among water professionals on the most important new water policies and practices needed to address the water crisis. These include:

- National water plan based on IWRM principles is essential, either as a separate sectoral plan, or as part of a five-year national development plan.
- National water quality and environmental plan is needed as part of the national water plan.
- The "polluter pays" principle is widely accepted, but has yet to be implemented.
- Wastewater to be treated and reused either for agriculture, or river and groundwater recharge.
- Water demand management for agricultural and municipal supply is a most important policy, but still requires stronger political commitment and can only be introduced gradually.
- Water metering and water charges are important components of demand management.

- Water tariffs provide the opportunity to recover water costs by pricing basic household use lower cost to protect the poor.
- There is a role for the private sector in financing, building and operating parts of the water service infrastructure.
- Revised agricultural planning is needed to encourage farmers to grow high value, water efficient crops.
- The development of local water user associations is needed to manage water delivery.
- Water education for the public and training for water workers and managers needs a much higher priority for local expenditure.

### **What is missing in the ESCWA region?**

- A poor perception in many countries of the complementary nature of water sector policies and their contribution to economic, social, environmental and health objectives.
- The management of water resources is fragmented among many sectors and institutions with different objectives (ministries of irrigation, public works, water and electricity, environment, agriculture, housing and urban planning, etc.).
- Extensive reliance on government for water collection, treatment, conveyance, distribution and disposal undermines a more effective role for stakeholders in water planning and distribution.
- Monitoring the quantity and quality of water resources is lacking and not effectively practiced.
- In most ESCWA countries the quality and organization of the existing information systems are inadequate.
- In some of the ESCWA countries, water resources staff are generally trained as engineers and the low salaries they receive undermines morale and discourages commitment and initiative.
- Regulations are often weak and usually not enforced.
- In many countries, water legislation is often outdated or has evolved on an ad hoc basis.
- In practice, governments are very reluctant to implement their own water policies.
- Most governments in the region are unwilling to accept the idea of water reallocation from the irrigation sector to domestic and industrial uses and face major obstacles in attempting to reduce the huge water losses.

## **A2. WATER LEGISLATION - Laws, regulation and enforcement**

### ***Rationale***

IWRM relies on an effective legal framework, sound institutional directives and effective human resource development to ensure that national policies are put into effect. The role of water law is to implement and enforce policy and to provide effective administrative and regulatory mechanisms at appropriate levels. Thus, water laws are essential and powerful tools to support the application of IWRM. Creation of modern, IWRM-supporting water legislation should follow from the development of integrated and coherent water policies. Without appropriate policies, institutions cannot function; without appropriate institutions, policies will not work; and without a set of policies and institutions, management tools are irrelevant.

### ***Objectives***

1. To introduce the basic notions of water law and governance.
2. To provide a broad overview of the required legislative and organizational framework in the implementation and enforcement of IWRM policy.
3. To evaluate the effectiveness of the current legislation and institutional structure in ESCWA member countries and the needs for law reforms or updating.

### ***Issues***

- Are the current legal and institutional frameworks in your country conducive to good IWRM planning and implementation?
- How do recent water laws differ from traditional local laws?
- What are the barriers to implementing and enforcing modern water laws?

***Legislation*** establishes the basis for executing water policies and strategies. They provide the context in which government entities can take regulatory action. It identifies the mechanisms for preventing and resolving conflicts that may evolve among some of the interested parties regarding water rights and use, water-sharing, water

development, water disposal, water pollution and other disputable issues. The legislation system must touch on all aspects of water use, such as monitoring the quantity and quality of surface water and groundwater sources, water allocation and transfer among users. Laws are needed to control water-charging and pricing, private sector participation in water management, reuse of wastewater and discharged irrigation water. Water law should also establish procedures for dialogue and consensus among all interested parties, governmental administrations, local authorities and users, and ensure application and enforcement of all water legislation.

***Regulations*** are the tools for local implementation of national laws, using by-laws, rules, agreements and standards. They typically deal with water and land-use rights, groundwater extraction; standards of water supply and distribution services; water charges and cost recovery; water quality and other environmental and health standards.

***Enforcement*** of water legislation is a pre-requisite for its effectiveness and rests on the relevance and flexibility of its regulations and on the administrative machinery required to ensure compliance. Enforcement of laws and regulations depends on local political will, the efficiency of local institutions, and the strength of enforcement capabilities.

***Institutions***, in their widest sense, comprise systems of laws, regulations, decrees, organizational arrangements, customs, markets, economic and financial instruments and all other components associated with them. The institutional framework should clearly define the mandates and responsibilities of the various actors. In particular, organizational arrangements should specify, the exact responsibilities and authority granted to perform tasks related to water planning, coordination among various water users, the regulations and enforcement mechanism designed to protect and reconcile the interests of all groups and the management of physical operations.

## **Legislation and institutional arrangements in the ESCWA countries**

Most water legislation in the ESCWA region was enacted between 1967 and 1985. During the last 10 years some countries (Egypt, Jordan, Oman and Yemen) have made an effort to revise or modernize existing laws, or to introduce new water legislation and strengthen institutional arrangements. Some of the ESCWA member countries are in the process of updating their water legislation. Others are formulating new legislation and attempting to centralize their water institutions.

However, the content, coverage and jurisdiction of their water legislation may fall short of what is needed for implementing an integrated approach to

the development and management of water resources. Enactment of a modern water code would contribute much to IWRM. Furthermore, enforcement of existing or planned water legislation has not yet received proper consideration. There is a need to establish an effective judicial water system, with routine and mandatory inspections, delegated legal enforcement powers and an increase in the manpower and financial resources.

Legislative and institutional status in selected ESCWA countries is given in Table 4 below. All ESCWA countries have at least initiated steps towards introducing measures of IWRM and most countries are already undergoing, or have recently undergone, institutional reforms towards the introduction of IWRM.

Country	Legislative status		Ownership	Use	Institutions
	Past	Present			
Jordan	Vestiges of <i>Majalla</i> and a few laws, 1937-1988	Fragmented, most recent laws are Nos. 18 and 19 of 1988	State property (explicit)	Regulation by permit for both surface water and groundwater	Single, Ministry of Water and Irrigation, with two water authorities, 1988 need to be updated
Lebanon	Vestiges of <i>Majalla</i> and French code and a few laws and decrees, 1925-1985	Fragmented, but there are plans for a comprehensive law	Public domain (implicit)	Regulation by permit and old irrigation code	Ministry of Hydraulic and Electric Resources; a few other ministries and many commissions
Oman	Sharia, customary practices, and well and <i>aflaj</i> registration laws, 1975-1988	Fragmented regulatory decrees for wells and <i>aflaj</i> , 1995	State property (explicit)	Extensive regulation by permit for development of groundwater and <i>aflaj</i>	Single, Ministry of Water Resources, 1989 need to be updated
Saudi Arabia	Sharia and customary laws, water conservation regulations and many decrees, 1932-1988	Planning for a comprehensive law	State property (implicit)	Regulation by permit, mainly groundwater	Single, Ministry of Water and Electricity (from 2002)
Syrian Arab Republic	Vestiges of <i>Majalla</i> code sharia, and many decrees and laws, 1925-1995	Comprehensive water law under preparation	Public domain (implicit)	Elaborate permit system; regulation for both surface water and groundwater sources	Ministries, mainly of irrigation (1982) but also of housing, agriculture, public work and water resources
United Arab Emirates	Sharia, customary laws and a number of decrees, 1980-1994	Comprehensive water law drafted in 1995	Public domain (implicit)	Limited regulation by permit system for groundwater	Several Ministries, municipalities and the Higher Water Council, 1981
Yemen	Sharia and many customary laws and decrees	Comprehensive water law drafted in 1995	State property (explicit)	Regulation by permit system and old practices	National Water Resources Authority, 1995

**Table 4: Legislative status in selected ESCWA countries (ESCWA, 2003)**

## **A3. WATER INSTITUTIONS AND BUILDING CAPACITY**

### **Forms and functions for organisations**

#### **Rationale**

Water governance deals with the design and implementation of public policies for sustainable water management. Without appropriate policies, water institutions cannot function; without appropriate institutions policies will not work; and without a working set of policies and institutions, management tools are irrelevant. Without good governance civil society will not support national policies and will not achieve sustainable water use. Good governance requires, above all, institutional transparency and participation by the citizens.

Weaknesses in institutional arrangements are the major constraint in the enforcement of legislation aimed at achieving IWRM. Fragmentation of authority is found in most of the member countries owing to the large number of ministries dealing with water resources, as well as to the lack of cooperation and coordination in carrying out activities. Developing coordination, cooperation and ultimately integration between ministries and water organizations is central to IWRM.

#### **Objectives**

1. To understand the importance of institutional frameworks for implementing water policy and legislation.
2. To discuss current organisational arrangements in ESCWA countries and their strengths and weaknesses for implementing IWRM.
3. To identify capacity building needs for IWRM in organisations and personnel.

#### **Issues**

- Coordination and integration of water organisations is said to be necessary, but what are the implications, costs and benefits, and trade-offs that would be required?
- Disaggregated organisations represent strong power bases and vested interests: who will have the authority and will to bring them together?
- Are current institutional arrangements in your country conducive to introducing IWRM?

- What is the priority need for capacity building in IWRM institutions?

#### **Institutions and reform**

The existing institutions largely determine whether IWRM can be practically achieved. The transition from an emphasis on supply management to a balanced strategy of managing both water supply and demand must be accompanied by effective institutional reform. Institutional weaknesses are the major causes of unsustainable and ineffective water services. The main difficulties faced in the implementation of IWRM strategies are not the lack of technical solutions, but the deficiency of the existing organizations and lack of enforcement of water acts and regulations. Re-organisation of the existing institutions is one of the most important steps in promoting IWRM.

The transition to IWRM will include a clear separation between planning and regulatory functions, on one side, and operational services on the other. The government will need to consider the scope of its own direct involvement in water management, overcome the current fragmentation of institutional responsibilities, specify organizational responsibilities, ensure that organizations have the capacity to discharge their responsibilities, and that stakeholders are involved in decision-making.

There are many organizations representing important water use sectors that do not have direct water management responsibilities, but can have a major impact on water resources –environment, agriculture, industry, trade, tourism, and energy for example. The establishment of a water resources council as an “Apex body” may be one possible solution to overcome coordination problems between ministries, as suggested in Oman and the United Arab Emirates. A water resources council, at national or local level, serves to bring together a wide range of stakeholders and gives them a greater awareness of the issues and an opportunity to participate in policy development.

## Capacity Building

Capacity building entails the ability to “perform functions, solve problems and set and achieve objectives for sustainable water resources management”. It is not just about acquiring new skills, but also the ability and opportunity to use them. It is a dynamic process, whereby acquired knowledge at individual and institutional levels becomes catalyst for change. Capacity building evolves at three inter-dependent levels, which should be balanced and coordinated in order to ensure that the process is sustained over time and is owned by the community where it is initiated. The three levels are:

**Individual:** human resources development that enables individuals to embark on continuous process of learning and skill upgrading in their careers as water professionals.

**Institutional:** organizational development that supports and encourages innovation, change management, learning and development of knowledge.

**Societal:** community development that improves knowledge and understanding of water issues and instils a willingness to participate in efficient water use and management.

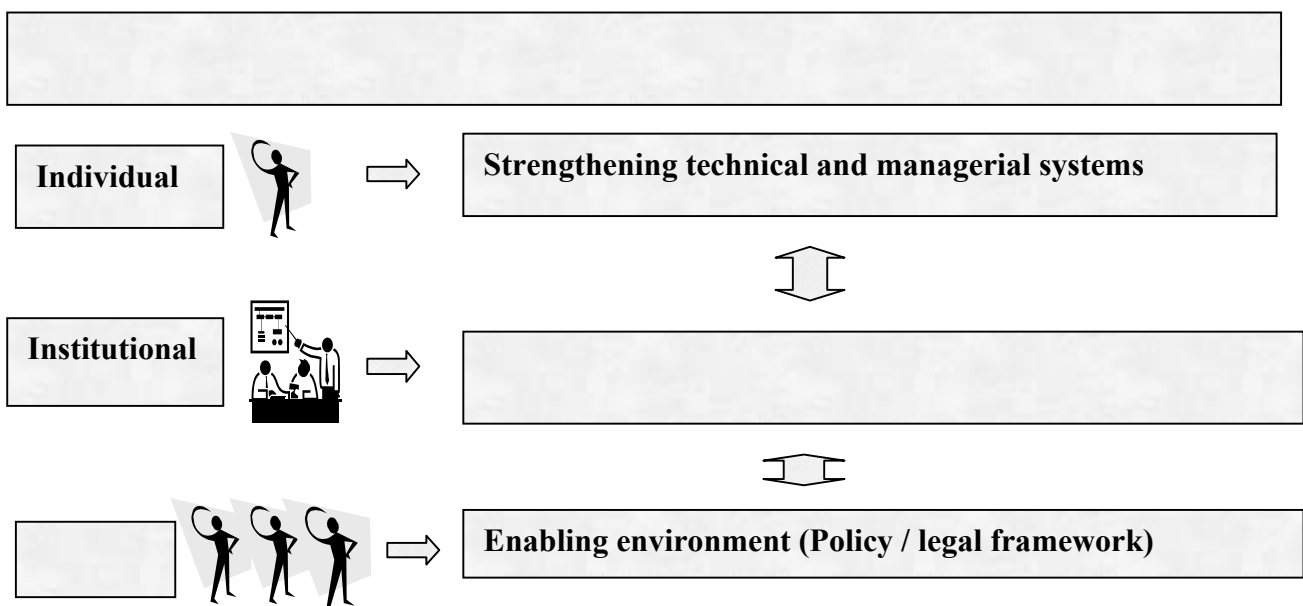
## Current institutional arrangements in the ESCWA Region

In Bahrain, Kuwait, Qatar and the United Arab Emirates, ministries dealing with electricity and water, agriculture and municipalities, or agriculture and fisheries share water responsibilities. In addition, there are numerous metropolitan water and sewerage authorities.

Overlapping responsibilities and functions between water institutions still exist in all member countries. Many water functions are scattered among numerous departments. Coordination and cooperation between agencies has not been mandated by legislative instruments, resulting in the mismanagement of resources and unnecessary duplication or gaps in monitoring activities and enforcement procedures. In addition, water institutions lack the legal power to enforce laws and regulations.

At the local level, administrative and organizational aspects of water allocation and distribution differ among countries, often involving older traditional practices and complex regulations. In the larger cities, the municipality, or water department, manages water for domestic and industrial use. In most towns and villages, government-appointed administrators manage water and sewerage.

## Capacity Building for IWRM



## **A4. STAKEHOLDERS PARTICIPATION AND GENDER ISSUES**

### **Giving people a voice in water**

#### **Rationale**

Water governance will only be effective if society's attitudes towards water use and management are changed. This is best achieved by involving people and giving them a voice in local water affairs. IWRM stresses the "Participatory Approach", where water is a subject in which everyone is a stakeholder.

"Gender Awareness" means assessment and response to the implications for women and men of a situation or planned action. Gender issues need to be targeted and understood within the norms of societies within the region. Participation and gender issues are evolving in most sectors of society where there is awareness that institutional roles for management and decision-making need greater involvement of society. Stakeholders participation can prevent or resolve disputes over water allocation among competing uses or shared water resources, which is important for the ESCWA region given that over 60% of water resources are shared resources.

#### **Objectives**

1. To identify stakeholders and appreciate their relevance to IWRM.
2. To identify issues/constraints for stakeholders participation in the region.
3. To define gender awareness and understand its relevance to IWRM.
4. To discuss gender awareness issues in the context of the ESCWA region.

#### **Issues**

- Who are the stakeholders and what is their role in IWRM?
- How are stakeholders identified, mobilized, maintained and encouraged?
- What is meant by gender mainstreaming in water resources management?
- What are the IWRM-related gender issues in your country?

- In your country, how are stakeholders, including men and women, involved in the management and development of water resources? If they are not, why not?
- Is there a need for capacity building on stakeholders participation and gender awareness in IWRM?

#### **Stakeholders participation**

Water users and beneficiaries are often referred to as primary stakeholders, whilst water organisations responsible for managing and delivering water are called secondary stakeholders. Stakeholder analysis provides a framework for identifying all relevant stakeholders, including those who will support or oppose change.

Participation means different things to different people and in different settings. For IWRM it may be stated as "*a process through which stakeholders influence and share control over water development or management initiatives, and the decisions and resources which affect them.*" There are four levels of stakeholders' participation:

1. Information: one-way flow of information
2. Consultation: two-way flow of information
3. Collaboration: shared control over decision-making
4. Empowerment: transfer of control over decisions and resources

#### **Gender awareness**

*Gender* refers to the specific roles and responsibilities adopted by women and men in society. It is related to how we are perceived and expected to think and act, as women and men, because of the way society is organized and not because of biological differences. A gender sensitive perspective implies that attitude, roles and responsibilities of men and women are taken into account, that it is recognized that both sexes do not necessarily have the same access to, or control over, resources and that work benefits and impacts may be different for both groups.

*Gender Mainstreaming* is the process of assessing the implications of women and men on any planned action, including legislation, policies, or programs in all areas and at all levels, so that women and men benefit equally, and inequality is not perpetuated.

In developing full and effective participation of women at all levels of decision-making, consideration has to be given to the way different societies assign particular social, economic and cultural roles to men and women. There is a need to ensure that the water sector as a whole is gender aware, a process that should begin by implementing training programs for water professionals, developing focused awareness campaigns and mobilizing community and grassroots organizations to advocate for gender balance in the management of water resources.

### ***Stakeholders participation and gender awareness in the ESCWA region***

In the ESCWA region, all countries have traditionally relied on their governments for water collection, treatment, conveyance, distribution and disposal. As a result, the central agencies have been overwhelmed by the size of their administrative and financial responsibilities. Consequently, the quality of water services has continuously deteriorated in many countries, such as Yemen, Jordan and Egypt.

The role of stakeholders in formal municipal water planning and distribution is sometimes weak, or completely missing. However, informal groups of water users in rural and urban communities, often led by women, are mobilizing collectively in order to manage local sources, or negotiate with private vendors. These groups need technical support to maintain water quality standards.

In some countries, such as Egypt, the Syrian Arab Republic, Oman and Yemen, attention has been directed toward involving NGOs, such as Water User Associations (WUA), Farmers Unions, etc. These associations have helped with operation and maintenance (O&M) and assisted in some distributional and financial responsibilities. There is not enough institutional experience on gender issues and gender mainstreaming in formal water resources development, management and planning in the ESCWA region. Gender balance needs to be seen as an integral part of stakeholders' participation. The public and private water sectors can learn from the experiences of NGOs and community organisations.

## **A5. FINANCING STRUCTURES**

### **Financial resources to meet water needs**

#### **Rationale**

As competition for water grows among users, water resources investment and management decisions will have significant implications for society and its economic welfare. For a water service to be economically sustainable, user payments should contribute to recover the full cost of the service. Theoretically this should cover the full cost of the development of a source, the operation and maintenance costs associated with treatment and distribution, and the indirect social and environmental costs. These costs should be recovered through a water-charging scheme that is appropriate to local political and socio-economic situation. In particular it will be important to design tariffs that provide water essential for basic livelihoods at an affordable price, or subsidised by the local community or state. In the most arid parts of the region these costs are high, although offset by state subsidies funded by oil revenues in GCC countries.

The simplest level of cost recovery covers operational costs such as manpower, treatment chemicals and pumping. The investment cost of developing the source (borehole or desalination plant) should be added. At the highest level the environmental costs of draining rivers and wetlands, or constructing dams, should also be included.

An important feature of IWRM is to improve operational efficiency in distributing and using water, through demand management and improved maintenance of the infrastructure. This places a higher priority on annual operational budgets. It also requires an understanding of discounted cash flow to compare routine annual expenditure with major capital infrastructure investments.

#### **Objectives**

1. To introduce water economics, financing and cost recovery in the ESCWA region.
2. To introduce the concepts of value and cost of water, and economic evaluation methods, and their data requirements.

3. To familiarize water resources managers with key economic implications of water policies and practices.
4. To raise the issue of water sector financing and cost recovery and explore options of financial sustainability.

#### **Issues**

1. Why should we have to pay for water? As water professional how do you explain this to a politician?
2. How do you compare the cost of water production and delivery with water charges in your country? Are they comparable?
3. Bearing in mind the principles of IWRM, who should make the decision on the final prices charged for water services and why?
4. How can the poor afford basic water needs for food, health and hygiene?
5. How might sustainable financing be pursued in your country and in the ESCWA region?

**Water as an economic good.** IWRM affirms “water has a social and economic value in all its competing uses and should be recognized as an economic and social good”. As a scarce and productive resource, water should be allocated according to economic principles of efficiency and equity. There is also a need to assess the broader cost to the economy (e.g., opportunity cost and externalities) in addition to the more traditional financial costs to individual users (e.g., investment, operations and management) when comparing management options.

Importantly, it does not necessarily mean that water services must be sold at a market price. Market failures, divergences between social and private costs and values of water, and social or environmental imperatives may well justify setting water services prices that focus on equity concerns (as a matter of policy) over efficiency concerns (as a consequence of market forces). Even in such cases, however, it is important for policy makers to understand the economic costs and implications of their decisions, which is the essence of proposals to treat water as an economic good.

**Water Value, Cost and Pricing.** A distinction has to be made between three important principles: water valuation, water costing and water services pricing.

1. *Water valuation* means setting priorities of water use according to its economic value (using the opportunity cost concept).
2. *Water costing* means the cost of providing a specific water service, including the cost of extraction, treatment, and transport as represented through capital and operation and maintenance costs.
3. *Water services pricing* means setting a price or water tariff as a tool for demand management and/or as a mean for cost recovery of services (i.e., applying an economic instrument to affect behaviour and maintain resource and service sustainability).

### **Economic tools for water resources management**

The economic approach accounts for the value of water to society, costs of developing and

distributing water are calculated and an appropriate tariffs for water is set that meets society's needs. Water tariffs can include water and wastewater pricing, groundwater abstraction license fees, water resources fees, irrigation charges, pollution charges and fines.

The cost of water provision can be estimated using a number of cost concepts: long-run marginal cost, short-run marginal cost, average costs of supply, or even using O&M cost. Marginal cost pricing, according to the future average incremental cost of water supply is hard to apply in many cases. It may be easier and more realistic to set water services prices to cover the financial cost of water and gradually move on to cover the economic cost and, eventually, the full cost of water supply or sanitation.

A review by ESCWA across the region shows that costs and prices for water in the late 1990s vary considerably (ESCWA, 2003), according to factors such as the degree of exploitation of available sources, use of oil revenues, water subsidies provided and national socio-economic objectives.

	<b>Costs / charges US\$ per m3</b>
<b>Source development (per m3 capacity)</b>	<b>From 0.01 (groundwater &amp; Nile water) to 2.5 (desalination)</b>
<b>Water supply delivery (O&amp;M) (per m3)</b>	<b>From 0.02 (groundwater) to 2.5 (desalination)</b>
<b>Domestic water charges (per m3)</b>	<b>From 0.02 (Egypt, Saudi Arabia) to 1.3 (Oman)</b>
<b>Irrigation water charges (per m3)</b>	<b>From 0.02 (Jordan) to 0.23 (Bahrain)</b>

*Table 5: Typical range of water costs and charges in the ESCWA region (ESCWA,2003).*

## **5- PART B WATER USES**

Most people are aware that around 90% of all water in the ESCWA region is taken for irrigation and agriculture. Although only 10% is currently used for municipal supplies, this proportion will increase as rural populations migrate to urban environments. Water users in one sector often forget the impact of their own water use on other sectors, especially the natural environment. These modules will be of interest to policy makers, managers and water users alike.

### **PART B - WATER USES**

#### **B1. FOOD, AGRICULTURE AND IRRIGATION**

##### **Food security and irrigation efficiency**

The ESCWA region is dependent on substantial food imports, in spite of huge investments in irrigation. Water use for agriculture is in many cases inefficient and unsustainable in the long term in the poor communities.

#### **B2. DRINKING WATER AND SANITATION SERVICES**

##### **Urban, rural and industrial water services**

Water supply for domestic and industrial use is under increasing pressure from rapidly growing populations, rising standards of living and urban growth. Improved sanitation is badly needed to improve access to safe drinking water and public health for the poor.

#### **B3. ENVIRONMENT**

##### **Protecting the environment from pollution and degradation; the ecological component in water allocation and management**

pressure from development activities on water resources is degrading surface and groundwater environments, polluted rivers and groundwater sources reduce usability and lead to the loss of resource. In this respect, it is proved that IWRM works best in partnership with environmental agencies.

## ***B1. FOOD, AGRICULTURE AND IRRIGATION***

### ***Food security and irrigation efficiency***

#### ***Rationale***

Agricultural water use accounts for most of the water used in the ESCWA region. Some countries have rain fed agriculture, but most rely on irrigation. The average crop requirement per hectare in the ESCWA region is high, estimated at 11,500 m<sup>3</sup> per hectare per year. Low irrigation efficiency means that two or three times this amount is abstracted from surface and groundwater sources, contributing to the largest single wastage of scarce water resources.

The continuation of current agricultural practices in the ESCWA region is totally un-sustainable; it will lead to the depletion of already overdeveloped water resources. Vast improvements are needed in irrigation efficiency, reuse of wastewater and drainage water, and the cultivation of crops that consume little water but have high cash value. An unrealistic goal of national self-sufficiency in food production could lead to an unsustainable expansion of irrigated land. The countries that are most self-sufficient in food, like Egypt, Lebanon and Syria, rely primarily on surface water resources. Most countries are likely to be less than 60% self-sufficient in 2010, according to FAO (Table 6 below).

#### ***Objectives***

1. To discuss the issues of water security vs. food security.
2. To discuss the management of the irrigation sector/ on-farm water use efficiency
3. To introduce the concepts of Good Water Management measures in agriculture.
4. To discuss the introduction of water conservation plans.

#### ***Issues***

- Can food security be achieved in the ESCWA region without sacrificing water sustainability and security?
- How can we manage water use efficiently in agricultural?
- How can irrigation water pricing contribute to sustainable agriculture?

- What are the social and economical implications of moving away from food security?
- What are the social and economical implications of adopting more efficient irrigation schemes?

#### ***Food security***

To enhance food security, ESCWA countries have adopted policies and programs aimed at promoting the domestic production and consumption of food commodities. They are also facing the constraints of agricultural development in the region. This includes adoption of policies that address water scarcity, conservation of natural resources, improvement of dry land farming, adaptation and transfer of agricultural technologies, improvement of animal welfare and food safety.

The outcome of these efforts has resulted in increasing the production of main food commodities and narrowing the production gap, especially for cereals, vegetables, fruits and meat. However, the gap is still significant for sugar, plant oil and milk. The agricultural sector is, to a certain extent, the economic backbone of some countries for both food production and employment. A relatively high proportion of the national labour force works in agriculture in Oman (42%), Egypt (33%), Syria (32%), Saudi Arabia (14%) and Iraq (11%). Agriculture employs a much smaller proportion of local people in countries like UAE (8%), Jordan (7%), Lebanon (4%), Qatar (3%) and Bahrain (2%).

#### ***Agricultural Water Demand***

Agricultural water demand in the ESCWA region was 123 billion cubic metres (bcm) in 1990 and is expected to rise to 207 bcm by 2025. Countries that are major water users for agriculture include Egypt, Iraq, the Syrian Arab Republic and Saudi Arabia. Irrigation water requirements range from 500 mm in Lebanon to 1,800 mm in Egypt (equivalent to 18,000 m<sup>3</sup> per hectare per year), depending on crop and local rainfall regimes. This water requirement is much higher than in other parts of the world.

By way of comparison, the 15,000 cubic metres of water needed to irrigate one hectare for one year is sufficient to supply enough water for 300 Bedouin and 450 head of cattle for 3 years. The same volume of water would alternatively meet the domestic water requirements of 100 urban families for two years, or 100 hotel guests for 55 days.

### **What is Good Water Management?**

To the farmer, good water management means getting the right amount of water to the crops at the right time with minimum labour and expense. If this can be accomplished without creating other problems, such as a build-up of salt in the soil or losing water to spills and seepage, so much the better.

To the irrigation district, good water management means meeting the water needs of its customers as efficiently as possible, with minimum waste or loss. Good water management is, therefore, fundamentally important to good overall district management. To society, good water management means having adequate supplies of good quality water for all municipal, industrial, agricultural, recreational, and environmental needs. Those in charge of operating water supply and delivery systems bear the greatest burden of responsibility

for promoting and achieving the good water management demanded by society. The key topics explained are:

- (1) Fundamental Water Management Measures
  - Water Measurement and Accounting Systems
  - Water Pricing Structure
  - Educational Programs
  - Unaccounted for water, leakage control
- (2) Institutional Water Management Measures
  - Water Shortage Contingency Plans
  - On-farm Conservation Incentives
  - Water Transfers
- (3) Operational Water Management Measures
  - Improved Operating Procedures
  - Improved Distribution Control
  - System-wide Irrigation Scheduling
  - On-farm Irrigation Scheduling
  - Conjunctive Use

	< 60%	60-80%	>80%
<b>Egypt</b>		√	
<b>Iraq</b>	√		
<b>Jordan</b>	√		
<b>Lebanon</b>		√	
<b>Saudi Arabia</b>	√		
<b>Syrian</b>		√	
	√		

**Table 6: Selected food self sufficiency ratios in 2010(food production / total demand) (FAO, 2003)**

## **B2. DRINKING WATER AND SANITATION SERVICES**

### **Urban, rural and industrial services**

#### **Rationale**

Five of the Millennium Development Goals set at the UN Development Summit of 2000 are relevant to urban and rural water services:

1. To halve the proportion of people living on less than one dollar a day;
2. To halve the proportion of people suffering from hunger;
3. To halve the proportion of people without access to safe drinking water;
4. To ensure that all children, boys and girls equally, can complete a course of primary education; and
5. To reduce maternal mortality by 75 percent and under-five mortality by two thirds.

There are significant differences in service provision within the region. In most GCC states there is over 90% urban access to water and sanitation services. In other countries urban access to water is around 60 – 90%, whilst access to sanitation is much lower. In almost all countries rural access to clean water is lower than in towns and sanitation is very much lower, or nearly non-existent. Developing urban and rural water and sanitation services is an essential first step to improving health, alleviating poverty and initiating socio-economic development.

#### **Objectives**

1. Introduce the links between clean water supply, sanitation and human health.
2. Review municipal water and sanitation services in ESCWA countries.
3. Highlight the importance of Health Impact Assessment (HIA).
4. Introduce Public Private Partnerships (PPP) and regulation in water services.
5. Discuss policies and applications of demand management.

#### **Issues**

- Why are water services so important to socio-economic development and poverty reduction in urban and rural communities?
- Why has water supply sometimes failed to keep up with urban development?
- Why are sanitation services so much less developed than water supply?
- What progress each ESCWA country is making in water and sanitation towards meeting the MDGs and the development of national plans of action?

#### **Water, sanitation and health**

Water, sanitation and hygiene have important impacts on health. Water-related diseases include those due to micro-organisms and chemicals in water people drink; diseases like schistosomiasis which have part of their lifecycle in water; diseases like malaria with water-related vectors; and others such as legionellosis carried by aerosols containing certain micro-organisms. Water also contributes to good health, for example through hygiene. Poor hygiene leads to diarrhoea, the most prevalent cause of mortality in under-fives.

#### **Health Impact Assessment**

Health Impact Assessment (HIA) can be defined as the estimation of the effects of a specified action on the health of a defined population. It aims to assess the potential health impacts of policies, programmes and projects and improve the quality of public policy decision-making. HIA is a combination of methods by which a policy, programme or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population.

## Water and sanitation in the ESCWA region

ESCWA member countries report a wide variation in access to water and sanitation services. The levels and coverage of municipal water and sanitation services in some countries (as in Yemen, Jordan, Egypt and Palestine) are expected to improve in the coming decade. Meanwhile the picture remains bleak. In Yemen, for instance, 45 per cent of urban households are connected to the public water networks, but the rest are obliged to buy water from private vendors at very high prices. Only 10 per cent of Yemen's population is covered by public sewerage network. Rural water services' coverage is not only low in most countries of the ESCWA region, but it is also of poor quality in many locations. Many people rely on buying potable water from private vendors to secure quality (as in Lebanon, Egypt, Jordan and some of the GCC states) or pay to secure water availability, (as in Yemen and Jordan). The gap between public municipal water tariffs and the high price of water obtained from private vendors is usually extremely wide.

### Water and sanitation services

Performance of water utilities in the ESCWA region has not been very encouraging. Utilities are financed and managed by the public sector, with substantial subsidies from budget allocations.

Revenues generated in most cases cover only a portion of the operational costs due to low water tariffs and inadequate revenue collection systems. The water distribution systems are old with leakage ranging from 30-50%. Allocation of funds is lacking for the rehabilitation of the distribution system to reduce leakage and improve water quality. As a result there are regular burst pipes, poor water quality, leaking sewers and ineffective effluent disposal. Water utilities are often overstaffed with unskilled and administrative personnel, compared with international benchmarks. Staffs do not receive relevant training or development incentives, which contributes to the lack of initiative and motivation. There is a severe shortage of capable junior and middle managers in water utilities.

### Private Sector Participation and regulation

Private Sector Participation (PSP) is widely perceived to be the solution to the failure of many public water utilities to operate efficiently and make the investments required to meet community needs. However, converting a public sector monopoly into a private one provides no competitive incentives for the utility to operate efficiently, make appropriate investments or respond to consumer demands. Instead, an effective regulatory regime is needed, requiring new skills and capacity in government.

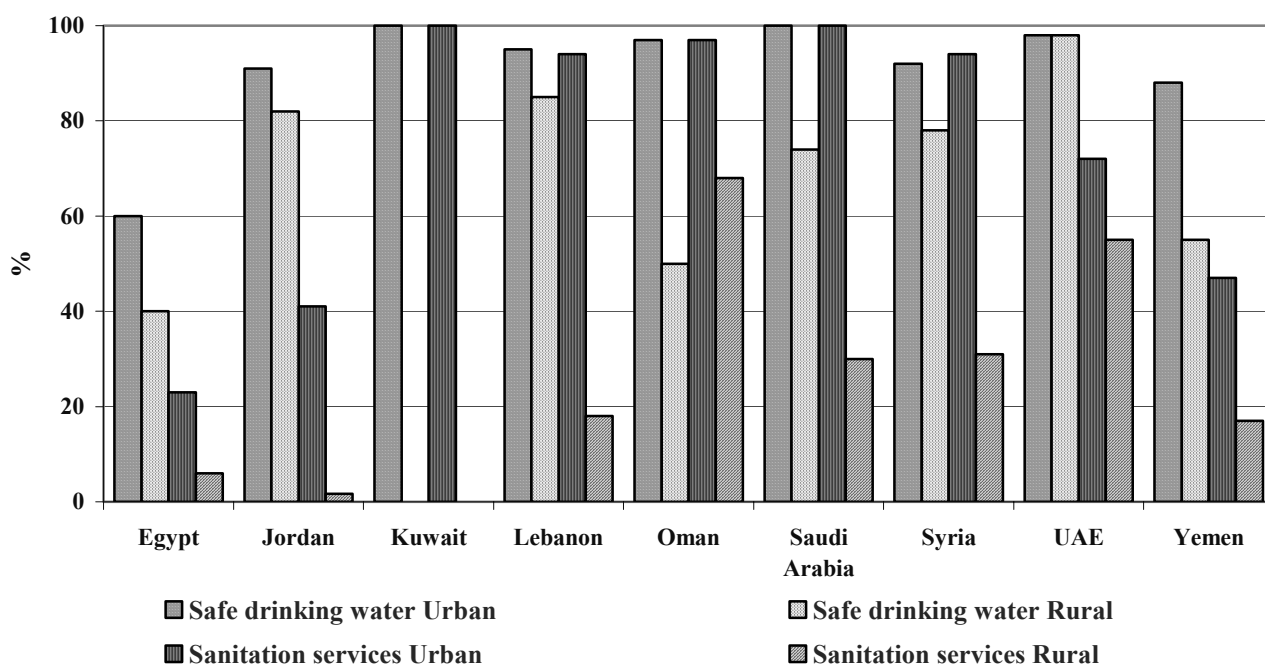


Figure 3: Access to drinking water and sanitation services (ESCWA 2001)

Regulation is, in practice, as much about creating the conditions under which private firms can operate effectively and efficiently, as it is about protecting specific customer and public interests. Privatisation *per se* can do little to improve sector performance if governments are unwilling or unable to tackle such underlying problems as uneconomic water pricing policies, over-manning, poor pay scales, financing investment, and avoiding over-intrusive political intervention.

There are a variety of privatisation options, including:

- Service contract;
- Maintenance contract;
- Leasing or Affermage;
- Build-Operate-Transfer (BOT);
- Concession;
- Divestiture.

The differences between the options relate to ownership or responsibility for assets, operation and investment, and who bears the commercial risks – public, private or shared. There is growing experience of several of these options in the ESCWA region and a better understanding of strengths and weaknesses of each one of them.

### ***Demand management***

In most of the ESCWA member countries, there is a need for simultaneous implementation of supply and demand measures. Demand management includes the implementation of water-saving technologies, public awareness campaigns, rebates for retrofitting, the modification of existing building codes, pricing mechanisms and regulatory schemes. Supply management is intended to complement demand management through cost-effective programs for leak detection, artificial recharge, water harvesting, and the use of reclaimed water.

#### ***Box 1***

#### ***Reforming Water Services in Yemen***

The Water Law 2002 is being implemented to develop, regulate and rationalise water resources management, through the National Water Resources Authority (NWRA). Urban water supply and sanitation is the responsibility of the National Water Supply and Sanitation Authority (NWSSA). The General Authority for Rural Water Supply coordinates rural water supply, in partnership with local councils who are responsible for implementing construction and managing water projects.

The Boards of Directors have been expanded to include water users and other stakeholders in the water and environmental sectors. New water policies include introducing water meters and raising tariffs.

(ESCWA, 2003)

## **B3. ENVIRONMENT**

### **Protecting the environment from pollution and degradation**

#### **Rationale**

The natural environment can be seen as a user of water, in direct competition with human uses such as withdrawal for irrigation or municipal supply, or as a carrier of pollution. River basins and groundwater aquifers support terrestrial and aquatic habitats for plant and animal species, but poor land and water management often degrade these. Excessive withdrawals or diversions from rivers have dried up wetlands and lakes. Excessive groundwater abstraction has dried up springs, wells, aflaj and oases. Excessive irrigation has salinised fields and polluted field drains.

Environmental (or ecosystem) sustainability is one of the three pillars of IWRM. This can be achieved by first carrying out an ecosystem assessment to estimate water requirements, especially where there are rare or endangered species. Then water development and management plans should be adapted to meet priority needs for ecosystem protection. The impacts of diffuse (from pesticides and fertilisers) and point source (industrial or municipal discharges) pollution need to be identified. Groundwater sources and aquifers need to be protected from the risks of pollution by discharges or landfill waste disposal. Water managers are beginning to avoid the worst destruction and degradation of environment, but much remains to be done, including restoration of the most badly affected water environments.

#### **Objectives**

1. To introduce the principles of sustainable ecosystem considerations into the management of the water cycle, with regional examples.
2. To apply biodiversity principles to IWRM.
3. To introduce Environmental Impact Assessment (EIA) principles in the context of IWRM.
4. To discuss the management systems needed to monitor, assess and protect the environment.

#### **Issues**

- What are the important ecosystems and their water requirements in the region?
- Which ecosystems are currently endangered as a result of poor land and water management?
- What aspects of local water management practices need to be modified to protect vulnerable ecosystems?
- How similar to/different from IWRM principles are the 12 ecosystem management principles from the Convention on Biological Diversity?

#### **Ecosystem Biodiversity Principles**

The Convention on Biological Diversity (CBD) (2003) has published 12 principles of ecosystem management. The CBD presents an approach to ecosystem management that integrates determinant monitoring and impact assessment across multi-disciplinary boundaries. The following are the CBD principles:

**Principle 1:** The objectives for managing land, water and living resources should be chosen by civil society.

**Principle 2:** Ecosystem management should be decentralized to the lowest appropriate level. (Subsidiary principle)

**Principle 3:** Ecosystem managers should consider the effects of their activities (existing or proposed) on adjacent ecosystems.

**Principle 4:** Ecosystem managers should understand and manage the ecosystem within an economic context.

**Principle 5:** Ecosystem structure and functioning should be preserved, as a priority target, to maintain ecosystem services.

**Principle 6:** Ecosystems should be managed within their functional limits.

**Principle 7:** The ecosystem approach should be implemented at the appropriate spatial and temporal scales.

**Principle 8:** Ecosystem management objectives should be set for the long term, recognizing the varying time scales that characterize ecosystem processes.

**Principle 9:** Managers should recognize that societal and environmental change is inevitable.

**Principle 10:** The ecosystem approach should seek to balance and integrate the conservation and use of biological diversity.

**Principle 11:** The ecosystem approach should consider all forms of relevant information, including scientific and local knowledge, innovations and best practice.

**Principle 12:** The ecosystem approach should engage all relevant sectors of society and scientific disciplines.

### ***Environmental Impact Assessment (EIA)***

EIA is a methodology for identifying, predicting, evaluating and mitigating the direct and indirect

environmental effects of a proposed activity, ideally before permission is given for it to commence. This may include not only the effects of construction projects, but also legislative proposals and operational procedures. EIA should be applied to different options for water resources development and management within the IWRM framework.

There is a particular need in the ESCWA region to assess the environmental impacts caused by water activities such as infrastructure development projects, irrigation, wastewater reuse projects etc. Examination of four ESCWA countries has revealed several general, region-wide, challenges to the effective implementation of EIA policies, including:

- Limited political and legal mandates
- Legal, institutional and procedural inefficiencies
- Poor quality of EIA outputs
- Limited human and technical capacity
- Limited financial capacity
- Ineffective application of environmental assessment methodologies
- Inadequate environmental information systems
- Limited public participation.

#### ***Box 2***

#### ***Environmental Awareness in Lebanon***

A survey of farmers in Lebanon showed that 70% of them thought that their agricultural practices had no negative impacts on the environment. Greatest understanding of environmental impacts was found in the south of Lebanon where there are many NGOs working. Bad practices includes improper disposal of unused agrochemicals and their containers, over dosing pesticide applications and over irrigation.

Best management practices being promoted include:

- Safe disposal of agro-chemicals
- Improved terracing
- Accurate dosing applications of fertilisers and pesticides
- Planting trees as wind breaks

(ESCWA, 2001)

## **6- PART C**

# **WATER MANAGEMENT TOOLS**

Water Management Tools address the skills that are needed by water managers and professionals. Some topics may have been covered as part of regular university, education courses on water resources, hydrology or groundwater, but others will be new – for example, demand management, paying for water, using regulations, managing disputes and promoting awareness. Learning to use these tools is an essential part of professional development towards a management role.

### **PART C - WATER MANAGEMENT TOOLS**

#### **C1. WATER RESOURCES ASSESSMENT**

##### **Understanding resources and needs**

Methods are needed to assist with water resources assessment, starting with the collection of hydrological, groundwater, demographic and socio-economic data. Systems and models are set up to analyse and report data.

#### **C2. INTEGRATED BASIN PLANNING AND MANAGEMENT**

##### **Combining development options, resource use and human interaction**

River and groundwater basin planning entails comprehensive assembly and modelling of data from all relevant domains. There is a need for the harmonization and standardization of assessment methods. Infrastructure planning should recognise the need for parallel action plans for the development of management structures.

#### **C3. MANAGING GROUNDWATER**

##### **Sustainable development and protection**

Groundwater is the hidden resource not easily understood by the general public. It needs careful management to avoid over development and depletion.

#### **C4. DEMAND MANAGEMENT**

##### **Managing demand and supply by using water more efficiently**

Demand management balances supply and demand, focussing on the better use of existing water, reducing excessive use and wastage, rather than developing new supplies. Water tariffs can play an important role in demand management.

#### **C5. VALUE OF WATER**

##### **Water has an economic value for better efficiency and equity**

Recognizing the economic value of water is the first step to recovering costs from users or the state. Appropriate tariffs for water services can provide incentives to consumers to use water carefully, whilst taking into account the needs of the poor.

#### **C6. USING REGULATIONS**

##### **Water allocation, enforcing water use limits and policing pollution**

Regulations are used to implement law on water quality, service provision, land use and water resource protection. Regulations are the key for implementing local plans and policies and can be usefully combined with economic instruments. Often they have not been drafted, or no resources are allocated to their enforcement.

#### **C7. MANAGING SHARED RESOURCES**

##### **Managing disputes, ensuring sharing of water**

Within the ESCWA region there are a number of long standing disputes over water. There is a need to develop transboundary negotiation and conflict resolution skills, leading from potential conflict to cooperation.

#### **C8. PROMOTING AWARENESS AND EDUCATION**

##### **Encouraging a water-oriented society**

Raising public awareness and educating all sectors of society is a powerful tool for changing behaviour and attitudes towards water use, through public information campaigns, school curricula, university water courses and professional development. Openness and transparency with information underpins good governance.

# ***C1. INTEGRATED BASIN PLANNING AND MANAGEMENT***

## ***Combining management and development options, resource use and human interaction***

### ***Rationale***

The IWRM planning process is more flexible than the traditionally prescriptive long-term master plan. It seeks to balance long-term infrastructure investment with institutional capacity building to improve day-to-day management. Planning reflects the total activity in a river basin or groundwater aquifer, including agriculture, forestry, mining, urban development and other land uses. Good plans include social, environmental and economic assessment. The plan should provide a framework for regulating the use, conservation and protection of water resources, balancing requirements for broad economic development and the need to sustain ecosystems.

IWRM planning should take into account not only developments options within the water sector, but also management options for closer integration with other sectors that may have an impact on water resources such as agriculture, industry, tourism and public health. The planning process has a special role in strengthening good governance within a water management framework of goals, policies, and planned actions. National or master plans should provide a flexible framework for more detailed planning at the river basin or local levels, with participation of stakeholders. Plans need to be reviewed regularly and adjusted to meet current situations.

### ***Objectives***

1. To discuss the role and effectiveness of national water resources plans;
2. To develop the process of river basin management planning;
3. To integrate groundwater management plans into development planning;
4. To balance infrastructure development and management capacity building options in the planning process;
5. To discuss the role of participation and consultation in the planning process.

### ***Issues***

- To what extents do national water plans developed over the last decade follow IWRM principles in the ESCWA region?
- Are water plans integrated across all appropriate stakeholders' interests?
- Have current plans incorporated stakeholders' consultation, including trans-boundary consultation?
- Do groundwater management plans identify unsustainable situations where there is excessive uncontrolled abstraction and irreversible aquifer deterioration?
- Do IWRM plans incorporate health, environmental, social and economic assessments?
- How much progress has been made towards achieving Millennium Development Goals in the ESCWA region?

### ***Methodology***

Tools to be introduced include: information requirements for national integrated planning; demand forecasting; river basin and aquifer planning; GIS; stakeholders' participation in planning process.

## ***C2. WATER RESOURCES ASSESSMENT***

### ***Understanding resources and needs***

#### ***Rationale***

Water Resources Assessment (WRA) is a collection of tools to evaluate the availability of water in time and space in relation to the local environment and human impacts. Water resource development plans may command a significant proportion of a national budget, but their design depend on the reliability of basic data and the validity of modelling and forecasting techniques. Water resources data collection and management is often neglected and introduces additional risks and costs to the planning and investment process. Data is often collected by a variety of organisations and not effectively shared or integrated across river basins or groundwater aquifers.

The main uncertainties in assessing the balance of supply and demand include the accurate measurement of water abstracted from surface and groundwater, the effects of climate change and variability and reliable forecasts of population growth and their impact on the demand for domestic and agricultural water.

In a region that relies heavily on unsustainable mining of groundwater, an accurate assessment of the situation of these aquifers and the effect of overdraft on the quantity and quality of the water is a top priority.

#### ***Objectives***

1. To demonstrate the need for a sound water resources knowledge base.
2. To discuss investment in data collection and management in ESCWA countries.
3. To introduce integrated water resource assessment tools appropriate to the region.
4. To introduce IWRM models and water management indicators.

#### ***Issues***

- Is there adequate financing for the human resources needed to manage water resources data networks and databases in your country?
- Are water resource knowledge bases sufficient to allow reliable assessments to be made?
- Are modelling techniques sufficiently flexible to represent the outcomes of political and development scenarios?
- Are there appropriate water management indicators in the region and how does your country compare with others and over time?

#### ***Methodology***

Tools to be introduced include: data collection, processing and retrieval; GIS and data base management; aerial and temporal assessment; data requirements for water resource development and management; water balance models; surface and groundwater flow models.

## **C3. GROUNDWATER MANAGEMENT** **Sustainable Development and Protection**

### ***Rationale***

As the “hidden resource”, users, policy makers and politicians seldom appreciate the availability and vulnerability of groundwater. Many countries in the ESCWA region rely heavily on groundwater, but it is under serious threat of degradation by inappropriate use, mismanagement and contamination. Groundwater needs careful control if its use is to be sustained for future generations. Proper management is required to avoid unsustainable depletion of resources and pollution of what remains. There needs to be an increased awareness of groundwater at the planning stage, to ensure equity for all stakeholders and to match water quality to end-use.

### ***Objectives***

1. To identify groundwater resources in the ESCWA region, their current status and main management issues.
2. To discuss the concept of “sustainable groundwater management” in an arid region and introduce a more sustainable approach to using non-renewable groundwater.
3. To present and discuss options for groundwater management and protection through an integrated approach.
4. To present monitoring and modelling techniques as essential management tools.
5. To emphasise the importance of introducing and enforcing abstraction controls and groundwater protection zones.

### ***Issues***

- Do senior policy makers in your country understand and respond to the significant issues of groundwater management?
- What is the stage of groundwater resources development in your country? (Incipient stress; significant stress, unstable development; or stable highly developed.)
- What are the main groundwater management issues in your country/ESCWA region?
- What are the most efficient and suitable “demand-side” and/or “supply-side” actions for groundwater management under the prevailing socio-economic and political conditions of your country?
- Is groundwater resources protection, including abstraction control and quality monitoring, part of groundwater management practice in your country?

### ***Methodology***

Tools to be introduced include: groundwater in the hydrological cycle; monitoring groundwater quality and quantity; sustainable management and fossil groundwater; source protection; groundwater models.

## **C4. DEMAND MANAGEMENT**

### **Managing demand and supply by using water more efficiently**

#### ***Rationale***

Demand management is the management of the total quantity of water abstracted from a source of supply using measures to control waste and consumption. It reflects a major shift in the approach to water resources management, away from the traditional supply development (construction of physical source-works infrastructure) to an improvement in efficiency of use, conservation, recycling and reuse of water. The approach aims to change people's attitudes to water use by making them more aware of leakage and wastage.

The first priority is to reduce leakage losses in the abstraction, treatment, distribution and delivery of water to municipal and agricultural users. Government or regulatory pressure is often needed to persuade water managers to act effectively. The second priority is to educate water users about the need for water saving. The most effective demand management tool is to measure water supply by volume and use the price mechanism. Careful social marketing is needed to introduce demand management because most water users believe they have a right to use (and waste) water freely, without appreciating the impacts of wasteful use on society and the environment. Education should change attitudes in the long term, but awareness campaigns are needed to change short-term behaviour during droughts.

Successful demand management measures will postpone the need for investment in new infrastructure. In countries dependent on expensive desalinated water, water saving measures are particularly cost effective.

#### ***Objectives***

1. To identify the components of water demand and losses and introduce forecasting models.
2. To introduce tools for improving efficiency of water supply and agriculture.
3. To introduce the options for recycling and reuse.
4. To discuss the role of water pricing in managing demand.
5. To discuss the regulatory role in demand management.

#### ***Issues***

- How significant are distribution leakage losses and user wastage in your country?
- Is there a role for government and community leaders in promoting demand management?
- Do existing municipal water pricing schemes in your country improve water-use efficiency, and promote water conservation?
- What is the best charging structure to encourage the agricultural sector to achieve "more crop per drop?"
- What opportunities are there for reuse of returned irrigation water or treated wastewater?

#### ***Methodology***

Tools to be introduced include: component forecasts including leakage and wastage; water saving techniques in agriculture; municipal water conservation.

## **C5. VALUE OF WATER**

### **Water economics for efficiency and equity**

#### **Rationale**

Moving towards cost recovery for water services is a major challenge to water utilities and municipal government. Historically water services have been heavily subsidised and people are accustomed to paying only a very small charge for water, or receiving it free. Some associate free provision of water with religious tradition, whilst others associate it with government's social responsibility, especially in countries with high oil or mineral revenues.

Valuing water is an important tool for demand management and follows an understanding of the economic and financial principals of water resources management. (See A5.) Present water tariffs bear little or no relationship to actual water services costs and this is one of the main reasons for today's water crisis. The first objective of setting water tariffs is to generate realistic revenue for the service providers, to recover the cost of operational staff, and consumables such as power and chemicals. Later on, tariffs should reflect improved operational maintenance and the cost of new infrastructure.

The formulation of an effective pricing policy must be based on the evaluation of influencing factors such as the characteristics of water demand, the depletion of resources, cost recovery, social well-being and affordability, religious obligations, legal and administrative requirements, consumer acceptance, and administrative feasibility. As well as ensuring recovery of costs, an effective tariff should be:

- Affordable and should recognise the role of water in public health,
- Acceptable to the public with a clear, simple, fair structure,
- Administratively feasible, given the resources of the undertaking.

High tariffs for public services are always unpopular, therefore government and community leaders need to be well convinced that tariff structures are justifiable and fair and consequently give strong public leadership to positively mobilize their constituencies.

#### **Objectives**

1. To understand the true costs of water services and relate it to current charges for water.
2. To appreciate the benefits to society of paying the true cost of water services.
3. To present the alternative options for water tariffs and their regulation.
4. To consider affordable water tariffs for the poor.
5. To discuss the political, cultural and religious reservations towards paying for water services.

#### **Issues**

- Is paying for water services a politically sensitive issue in your country? If so why?
- What are the unit costs of producing water in your country and how do they relate to the price paid for water services?
- What are the factors, in addition to the cost of providing the service, which should be taken into consideration in the final pricing scheme?
- Does your country have a long-term strategy for setting water tariffs?

#### **Methodology**

Tools to be introduced include: economic analysis of water services; financial models for capital and operating costs; design of appropriate water pricing tariffs.

## **C6. USING REGULATIONS** **Water allocation, enforcing water use limits** **and policing pollution**

### ***Rationale***

Regulations are used locally to implement law on water allocation, abstraction, quality, service provision, land use and water resource protection. Regulations are the key for implementing local plans and policies and can be usefully combined with economic instruments. Often they have either not been drafted, or no resources are allocated to their enforcement.

Enforcement staff should not simply be local “policemen” penalising for unlawful practices. They should also take on a positive role of providing a customer service by helping water users to adopt best practice and explaining the true cost of water.

### ***Objectives***

1. To introduce the concept of local regulations to implement national legislation.
2. To introduce examples of regulations used to control: water resource allocation and abstraction, discharges, water using appliances, water service provision and quality, and river and groundwater quality.

3. To consider the practicality and feasibility of enforcement.
4. To identify the local conditions necessary to enforce regulations in an equitable and acceptable manner, to the benefit of society as a whole.

### ***Issues***

- Does the local political will and support to develop and enforce water management regulations exist in your country?
- How does the local legal system deal with enforcement procedures?
- Will local enforcement encourage corrupt practices?
- Does your local water agency have trained staff for enforcement?

### ***Methodology***

Tools to be introduced include: review of international use of regulations, enforcement options and procedures and best practice of effectively applying and enforcing regulations in region.

### ***Box 3*** ***Applying water regulations in Jordan***

The Ministry of Water and Irrigation has adopted a stepwise approach to introducing several strict new regulations over the last 15 years.

Prohibition of new well drilling in depleted aquifers and an inventory of groundwater utilisation has led to a significant reduction in abstraction between 1993 and 1997. The introduction of charges for groundwater was initially resisted by municipal, industrial and commercial users, but has resulted in the installation of water saving devices and a 10% reduction in demand. Farmers fiercely opposed the introduction of irrigation meters, but now a 95% compliance rate has been achieved.

## **C7. MANAGING SHARED RESOURCES**

### **Managing disputes, ensuring sharing of water**

#### **Rationale**

As the demand for water increases and shortages worsen in the ESCWA region, the potential for disputes over shared rivers and aquifers is increasing. It is vital that the region improves cooperation in shared water development and management. It is important to note that most of the water resources in the region are shared by 2 or more riparian countries, in addition to the fact that many ESCWA countries rely on water resources flowing from countries outside the region. In this respect, mutual cooperation will help to achieve sustainability in Integrated Water Resources Management. Successful cases of cooperation and conflict resolution within the region provide useful capacity building tools for strengthening negotiation skills of national teams involved in negotiations over shared water resources in the ESCWA Region.

#### **Objectives**

1. To introduce a framework for the management of shared water resources, covering hydrological, legal, institutional, socio-economic and environmental issues
2. To introduce the principles of international water law.
3. To introduce a framework for managing disputes in the ESCWA region.
4. To introduce the concept of conflict resolution

#### **Issues**

- What are the current problems regarding shared surface and groundwater resources in ESCWA countries?
- How is international water law related to modern national water law in the region?
- Do ESCWA member countries have agreed policies and frameworks for developing trans-boundary cooperation?
- Do water managers need to take a more proactive role in identifying the need for inter-state cooperation?
- Is there a shortfall in trained legal advisors and negotiators in ESCWA member countries?
- What is the role of the non-legal water resources specialist in managing disputes?

#### **Methodology**

Tools to be introduced include: a framework for managing shared resources; principles of international law; conflict resolution and negotiation skills; best practices within and from outside the region.

## ***C8. PROMOTING AWARENESS AND EDUCATION***

### ***Encouraging water orientated society***

#### ***Rationale***

Changing water use and management practices to achieve IWRM requires changes in the deeply held attitudes of individuals, institutions, professionals and social organisations within civil society. The key to encouraging an IWRM orientated civil society lies in participation – shared visions, through joint diagnosis, joint creation of options, joint implementation and monitoring. Effective participation is based on raised awareness of water issues.

A long-term programme for raising awareness of water issues should start with education in schools. An overall strategy for raising public awareness of water conservation can utilise commercial marketing techniques through “social marketing”. Professional and managerial staff needs to develop these skill and apply them in the workplace.

#### ***Objectives***

1. To discuss the role of education in schools and universities in water management and the role of water users and professionals in promoting IWRM
2. To consider the role of water education alongside education in hygiene, public health and environmental awareness.
3. To introduce the tools for developing a social marketing strategy for communication with stakeholders.

#### ***Issues***

- What are the main channels of public information in your country?
- Are water, health and environmental issues regularly covered on television, radio and in the press?
- Does your water organisation have a public relations and / or education department?
- What is the role of religious organisations in promoting awareness on water, health and environmental matters?
- What good example of raising awareness can you give from your country / ESCWA region?

#### ***Methodology***

Tools to be introduced include: introduction to social marketing techniques; planning and managing public awareness campaigns; developing water curriculum for schools and communities.

#### ***Box 4***

##### ***Promoting Water Awareness in Schools and Universities***

To celebrate the International Year of Freshwater 2003, ESCWA and UNESCO (Cairo Office) collaborated on two projects. An art competition was held for primary school children throughout Lebanon (ages 6- 12 years), in co-operation with the Educational and Social Council and a national newspaper. Twenty-five schools participated and over 600 pictures were received. The Minister of Energy and Water, Lebanon, presented the awards.

An ESCWA Water Research Prize was awarded to an undergraduate student for the most original work on a critical water resources management issue in the region.

(ESCWA, 2003)

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