

TRAINER'S HANDBOOK



Support for the Environmental Management of the Iraqi Marshlands:

IWRM for Policy Integration



**UNITED NATIONS ENVIRONMENT PROGRAMME
DIVISION OF TECHNOLOGY INDUSTRY AND ECONOMICS
INTERNATIONAL ENVIRONMENTAL TECHNOLOGY CENTRE
UNEP-DTIE-IETC**

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**Training Kit
SUPPORT FOR THE ENVIRONMENTAL MANAGEMENT OF THE IRAQI
MARSHLANDS
IWRM FOR POLICY INTEGRATION**

This training kit responds to the following need:

The development of an integrated approach to safeguard and improve the quality and quantity of freshwater in the Iraqi Marshlands

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SUPPORT FOR ENVIRONMENTAL MANAGEMENT OF THE IRAQI MARSHLANDS

A. Overview of the Iraqi Marshlands and their environmental priorities

The Iraqi Marshlands constitute the largest wetland ecosystem in the Middle East, with considerable environmental and socio-cultural significance. Recent assessments of environmental conditions in Iraq, as reported by UNEP and the UN/World Bank Needs Assessment Initiative for the Reconstruction of Iraq, have identified the destruction of the Iraqi Marshlands as one of the major environmental and humanitarian disasters facing Iraq (United Nations and World Bank, 2003). Critical problems and associated priority needs for the Iraqi Marshlands identified by the Iraqi authorities and the UN assessments include, among others, the following:

Marshland degradation: While the re-flooding of dried areas started in 2003, only 20 to 30 per cent of the original area has been re-inundated to date, with varying degrees of ecosystem recovery. Marsh water is contaminated with pesticides, salts, and untreated industrial discharges and sewage from upstream. Haphazard breaching of embankments has also resulted in contaminated water stagnating in some areas, impacting the recovery of both vegetation and fish. Water quality and marshland management is an urgent priority to protect human health and livelihoods, and to preserve biodiversity and the ecosystems.

Lack of drinking water: The 2003 UN/World Bank Needs Assessment and a public health survey by the US Agency for International Development (US AID) found that the provision of safe drinking water is the critical priority for the residents of the Iraqi Marshlands (United Nations, 2003). While some residents are able to purchase tanker water, many, particularly those living within the marshes, currently obtain drinking water directly from the marshes without treatment (US AID, 2004).

Lack of sanitation: Assessments found that most settlements lack basic sanitation systems, and wastewater is often drained through open channels to the nearest stream or to the street. The presence of human waste in the streets was noted in 50 per cent of villages in the region. Outbreaks of water-borne diseases are prevalent. The provision of wastewater treatment services is therefore a critical necessity for protecting the public health. In addition, the return of displaced persons to the marshland area continues to place an increasing burden on the provision of drinking water and sanitation.

The Iraqi authorities have recognized the above issues as priorities, and have submitted the following as project priorities, among others, to the Donor Conference: Management of Biodiversity in the al Hwaize Marshland (Project number 706), Provision of Treatment Units for Water and Sanitation (Project numbers 592 and 594), and Training Programme Development (Project number 704).

The need for immediate environmental relief in the Iraqi Marshlands was also raised as a priority by the high-level Iraqi delegation to Japan. In December 2003, Prime Minister Koizumi was requested in person to prioritize marshland management and restoration by a visiting Iraqi dignitary. In March 2004, the Iraqi Minister of Environment met with the Japanese Foreign Minister and Environment Minister and, again, requested that Japan prioritize support for marshland management and restoration. **Specifically, the Iraqi Minister of Environment requested assistance in the improvement of water quality, as well as in the provision of technologies, equipment, and training.** To respond to such requests, the Government of Japan

made contributions to the UN Iraq Trust Fund, and earmarked funds for this project. In addition, within the UN Iraq Trust Fund framework, the need for coordination of activities and strategy formulation for longer-term marshland management has been identified.

B. Project goal and components

Owing to the uniqueness of the Iraqi Marshlands ecosystem and its socio-cultural heritage, the technical and programmatic responses needed to address the above priorities may be quite different from those most appropriate for other settings. Also, an underlying factor that hinders the response is the limited capacities of, and availability of credible information for, policy makers, experts, and communities to assess and implement solutions. Given these observations, the goal of this project is to support the sustainable management and restoration of the Iraqi Marshlands by facilitating strategy formulation, monitoring and analysing current conditions, raising capacities for policy and technical management, and implementing environmentally sound technology (EST) options on a pilot basis. This project is an integrated package of five component activities, as follows:

- **Component 1: Support for strategy development and coordination**
This component facilitates strategy development for marshland management by analysing the current policy and institutional frameworks, and by providing initial support to assess the integration of environmental dimensions into the national marshland management coordination mechanism. Stakeholder and donor coordination activities also are supported.
- **Component 2: Data collection and baseline analysis**
This component addresses the need to establish a baseline for the marshland environment, and to collect and analyse the data needed to determine the potential intervention options required to meet the immediate needs for water, sanitation, and marshland management.
- **Component 3: Capacity building**
This component addresses the need to raise the capacity of Iraqi decision-makers in government and communities to develop and implement a policy and strategy framework for marshland management, as well as technical options for immediate mitigation of critical concerns.
- **Component 4: Pilot implementation**
This component addresses the need to identify suitable options, and provides support for the pilot implementation of such options in drinking water, sanitation, and marshland management.
- **Component 5: Awareness raising and follow-up**
This component addresses the need to raise awareness of marshland conditions, and the efforts to manage and restore this critical ecosystem. These issues are described in more detail in the project approach section below.

UNEP experiences relevant to the project, as well as indications of UNEP's implementation capacity, are summarized below:

- **Promotion of environmentally sound technologies (ESTs):** UNEP, through the International Environmental Technology Centre (IETC) of the Division of Technology, Industry, and Economics (DTIE), has provided technical and policy expertise for applications of ESTs in water and wastewater management and wetland management in developing countries. IETC has also supported related capacity-building activities, and provides guidance for decision-makers on appropriate policies and strategies (UNEP IETC, 2004). The Division has directly implemented over 1,000 cleaner technology assessments and demonstrations in 24 developing countries (UNEP DTIE, 2004).

- **Assessments of the Iraqi Marshlands:** Assessments carried out by UNEP have catalogued the degradation of the Iraqi Marshlands for several years, and alerted the international community to its potential destruction. UNEP has been the lead agency in monitoring and reporting on the recovery of the Marshlands (UNEP, 2001 and 2003).
- **Post-conflict assessments:** UNEP has provided environmental assistance to post-conflict countries since the late 1990s by investigating the environmental impacts of conflicts and pre-existing conditions, supporting decision-making, and initiating follow-up action. Locations of post-conflict operations include Afghanistan, Albania, Bosnia and Herzegovina, Kosovo, Liberia, and the Occupied Palestinian Territories (UNEP PCAU, 2004).

UNEP also has the experience and mandate to coordinate policy dialogue so as to ensure that environmental issues are adequately addressed within the scope of problems that encompass both environmental and non-environmental dimensions. Further, given the special constraints on local implementation in Iraq, additional measures taken to ensure the implementation of the Iraqi Marshlands project include the following:

- Establishment of a Project Implementation Unit (PIU) to be anchored within the Ministry of Environment, to provide technical support, to liaise with national and governorate institutions, and to oversee the project at the local level
- Employment of a national project coordinator, to operate out of the PIU
- Building the capacity of Iraqi experts and decision-makers first, and utilizing that capacity for implementation during the second stage of the project
- Contracting with UNOPS for assistance in local implementation, monitoring, and evaluation
- Coordination within Cluster 5 to evaluate the development and use of a common implementation framework
- Coordination with other UN agencies operating in Southern Iraq to carry out pilot projects in complementary and mutually beneficial locations, and to employ their local staff and contractors for implementation assistance on an as-needed basis.

C. Project approach

This project is an integrated package of five components, and specific activities under each component are summarized in the logical framework. The following section provides some key additional information on the linkages among specific activities.

Component 1: Support for strategy development and coordination

The development of a marshland management plan is a long-term process that encompasses various disciplines and perspectives, including transboundary resource allocation, agriculture, industry, food production, land use, socio-cultural heritage, and displaced persons, as well as environmental issues. Formulating such a plan will require individual strategy formulation and coordination within the above areas, consensus building, allocation of substantial resources, political will, and considerable institutional capacity.¹

Nevertheless, there is a current need to strengthen the coordination mechanism, and to provide environmentally sound input and objective analysis. There is also an urgent need to find and apply suitable options for immediate environmental relief, and to build the necessary capacity in Iraq for longer-term environmental management. This project aims to initiate this process by addressing such needs through various activities within this component.

UNEP is in the process of submitting another proposal that focuses on coordination, building upon the results and insights generated from this component. This additional proposal, which is in the UN Iraq Trust Fund pipeline, will support the development of the national, regional, and international strategies and action plans for marshland restoration, utilizing the practical knowledge and capacity from this project as building blocks. Discussions on activities to be undertaken within the next proposal are underway with the relevant Iraqi authorities.

Activities to be undertaken within this component include the following:

- **PIU establishment:** The project will establish the Project Implementation Unit (PIU) within the Ministry of Environment, and provide support to strengthen the institutional capacity of the ministry to address marshland management, and to establish an anchor for this project within Iraq. The PIU will, among other tasks, facilitate dialogue among various line ministries and stakeholders for the coordination of marshland activities, and provide implementation support.
- **Survey of policy and institutional frameworks:** The project will conduct a survey to assess the current policy and institutional frameworks for marshland management, and identify the roles and responsibilities of stakeholders. The clarification of the framework will articulate the decision-making process and actors, and help identify areas where priority actions and support may be needed by the national government and donors.
- **Roundtable organization:** Among UN organizations there is a need for a coordinated response for sound marshland management. To address this need, UNEP organized a Roundtable on Marshland initiatives during 2004 with Iraqi ministries and stakeholders, relevant clusters, and bilateral project personnel. Held in Amman, the Roundtable discussed the current status of various initiatives, both environmental and otherwise, that are taking place in/for the Iraqi Marshlands, and supported the dialogue for management plan development.
- **Support for environmental integration:** UNEP will provide support for assessments that aim to ensure that environmental dimensions are adequately reflected into the ongoing management strategy formulation within the country. Such support is intended to provide objective counter-analyses that are based on sound environmental science and policy perspectives.
- **Donor coordination:** As there are other bilaterally supported initiatives underway for marshland restoration and management, coordination of international activities is important to find and exploit synergies and avoid duplication. (See the section on specific assessments for further detail.) Such coordination has already been initiated, beginning with a meeting in early 2004 sponsored by the Italian government. UNEP participated in this meeting. Additional meetings will be organized regularly, with US AID sponsoring one in mid-2004. UNEP plans to host a further such meeting, scheduled for early 2005, to be confirmed upon full consultation with other organizations.
- **Post-phase needs assessment and strategies:** At the end of this project phase, results and observations will be used to formulate a report that identifies areas where further strengthening of institutional and policy frameworks may be warranted. In addition, the results of the pilot project will be used to develop a strategy for the wider implementation of suitable options for the provision of water supplies, sanitation and marshland management. This strategy will include a listing of priority areas and their current conditions, data on specific applications, current institutional capacities and identified needs, and recommended policies and strategies to support longer-term applications. This strategy will be submitted as a component of the marshland management plan.

Activities to be undertaken within this project cannot be put on hold until the master plan is developed, as immediate relief is needed as soon as possible. UNEP will ensure that this project will not jeopardize the intended objectives and outcomes of a longer-term management plan. UNEP will also ensure that project activities, particularly the pilot implementation activities, are in locations and conducted under operating conditions that will not be impacted by future re-flooding that may be stipulated in the longer-term marshland management plan.

Component 2: Data collection and baseline analysis

This component will focus on the collection of necessary data to establish the baseline conditions of the Iraqi Marshlands.

- **Data and analysis:** The following data collection and analysis will be carried out: analysis of ongoing hydrologic data and biodiversity assessments; water quality sampling and assessment; and monitoring and reporting of re-flooding and ecological changes using satellite imagery. The baseline data will be used to determine the patterns of re-flooding, community locations and changes in size, water quality and water availability for residents, and impacts on biodiversity. For example, various bilateral initiatives have undertaken hydrological assessments, developed models, and analysed scenarios for re-flooding. In addition, biodiversity assessments are being carried out to establish the geographical distributions of plant and animal species, and threatened areas. Such information will be collected and analysed to help identify areas where targeted actions by this project may be warranted. If needed, this analysis may be supplemented with small scale assessments of targeted areas. Based on these data, a water-quality sampling protocol will be established. Sampling and analysis will then be carried out to determine the extent of water contamination in various communities and locales. Such data will be used to determine suitable options and locations for the pilot project, as described in more detail under component 4. Monitoring and reporting on re-flooding will generate regular reports on changes within the Marshlands. Equipment will be provided to the line ministry to support remote sensing and GIS applications, so that the monitoring data on re-flooding will be available for analysis inside the country.
- **Marshland Information Network establishment:** The project will establish a web-based Marshland Information Network (MIN), which will: provide stakeholders with a forum to share information; provide a common point of access to tools for technical assessments and management; and facilitate the identification of solutions and the development of common strategies and partnerships among stakeholders. The system will be available in Arabic and English. The establishment of the MIN is expected to address the barrier of limited availability and sharing of environmental and social information regarding the Marshlands identified during UNEP's discussions with relevant Iraqi ministries. The system will use the EST Information System (ESTIS) framework, developed by UNEP IETC (UNEP IETC, 2003). ESTIS is one of the only information systems in the world with multilanguage compatibility, and is already utilized by various developing countries' agencies and organizations.
- **MIN node establishment:** To facilitate the active engagement of stakeholders at the local level, in data sharing, and monitoring, the project will provide equipment and support to establish MIN nodes at the PIU, and within relevant southern governorates.

Component 3: Capacity building

Identifying and implementing technical and policy responses for sustainable marshland management requires capacity. This project will provide capacity-building opportunities in multiple areas that are deemed necessary to develop a cross-cutting response to sustainable

marshland management. Such capacity building will be carried out in policy and institutional development, technical capability, and data management and analysis areas.

In addition, study tours will be conducted to provide opportunities to examine at first hand the following two areas: community-level actions and capacity-building activities, and EST applications. Given the current security concerns, these training activities will be carried out outside Iraq, in the region and elsewhere. Individual participants will be selected from key government agencies, governorates, and communities. Criteria for the selection of participants will be developed and used to identify suitable candidates. Institutional agreements and arrangements with employers will be negotiated, so that trained experts will be assigned to take part in the actual implementation and management of the pilot projects.

- **Policy and institutional development:** Sound environmental management of marshlands, including EST applications, must be based on an integrated water resource management (IWRM) approach. The relevant Iraqi authorities and decision-makers in communities and NGOs currently have limited understanding of this approach, and the formulation of practical policies and strategies to operationalize IWRM in the Iraqi context. Initiatives for marshland management must be anchored in the local communities. To address this need, capacity building will be conducted within the communities on the following topics: water quality management; wetland management; community-level initiatives; and IWRM policy integration. Thirty placements per topic will be made available to line ministries, communities, NGOs, and other organizations, resulting in a total of 120 training placements.
- **Technical training:** Identification, implementation, and management of EST options to provide water, sanitation, and marshland water quality management require specific skills in four key areas: ESTs for drinking water provision; phytotechnologies for wetland management (i.e. the use of plants and vegetation to manage wetland conditions and water quality – constructed wetlands being a prime example); sustainable sanitation options; and EST assessment methodology and implementation. A training curriculum and training materials will be developed for each area, based on the best current knowledge in the field and drawing, where appropriate, on existing UNEP and other products. For each skills area, a team of 30 technical experts will be selected to undergo this specialized training, resulting in a total of 120 training placements. For both policy- and technical-oriented training, the training curriculum will have a train-the-trainer component, and will supply materials to enable the trained experts to carry out site-specific training of local teams and communities at the pilot sites. Follow-up training on the above subjects will be supported.
- **Study tours:** Two study tours are planned within this project. The first study tour will provide opportunities to see and evaluate the integration of capacity building programmes into policy-making and community-level actions, while the second study tour will provide opportunities to visit and evaluate ongoing EST implementation projects.
- **Data management and analysis training:** Training on MIN utilization will be provided. The MIN system will be used to disseminate regular reports of satellite and remote sensing data on marshland re-floodings and their subsequent ecological changes. A training programme on remote sensing data analysis will also be conducted.
- **Support for local training:** Support will be provided to local organizations that provide training on wetland management, technical response, and community initiatives within Iraq. The aim of this support is to ensure the localization and ownership of training activities to educate a larger number of citizens and communities on the practical options for wetland management. The scope of support

and selection criteria will be established upon consultation by the PIU with relevant local communities.

Component 4: Pilot implementation

The project will identify suitable options for marshland management and for the provision of water supply and sanitation on a pilot scale. Technical options that are considered to be environmentally sound; i.e. environmentally sound technologies (EST), will be the focus of such implementations. ESTs are defined in Chapter 34 of Agenda 21 as technologies that: protect the environment; are less polluting; use resources in a more sustainable manner; recycle more of their wastes and by-products; and handle residual wastes in a more acceptable manner than the technologies for which they substitute (United Nations, 1992). ESTs go beyond individual technologies, and encompass total systems that include the technical know-how, operational procedures, and organizational and managerial procedures. The need to facilitate EST transfer and accessibility, and to build capacity for EST deployment and use, particularly in developing countries, is clearly set out in Agenda 21. ESTs cover a wide spectrum and many can be described as ‘low-tech’ or appropriate technologies that may be widely used in developing countries. ESTs that are suitable for developing countries tend to have low energy intensities, require less maintenance, create increased employment, are culturally acceptable, and often cost less to acquire and operate.

For example, constructed wetlands have been used to treat wastewater before direct discharge, or as part of a more comprehensive treatment process.² Sustainable sanitation, such as urine separation, enables faster and more efficient recovery of nutrients for agricultural applications, with lower risks of diseases and contamination. Grass plots have been used to process human wastes in communities with relatively low wastewater volumes that possess the necessary areas, with highly impermeable soils, for treatment. Figure 1 shows a range of appropriate ESTs. Many of these ESTs could be used effectively in rural areas, such as the Iraqi Marshlands. During the pilot phase of this project, UNEP will identify two or three ESTs for implementation. The selection criteria and strategy are described in the Project Approach section below.

The pilot-scale implementation of ESTs will focus on three areas of application: drinking water provision, sanitation provision, and wetland water quality management. At least three communities will be chosen for pilot projects within each application area. For each community site, up to three suitable EST options will be identified, and one or two will be implemented. The selection of candidate sites for the EST pilot projects will be carried out by the PIU, in consultation with the line ministry, other relevant ministries, and stakeholders, reflecting domestic priorities. The baseline data to be collected under component 2 will be used for the feasibility analysis. The site selection criteria to ensure sustainability include the following:

- Demonstrated need for interventions
- Size of the community
- Probability of re-flooding, and physical and population stability
- Access and security for implementation and monitoring
- Likelihood of replicability and wider application (i.e. how typical are the geographic, population, social, lifestyle, and environmental characteristics? How relevant is the experience at a particular site to other communities?)
- Availability of basic materials, energy, and physical space for technology installation
- Level of community willingness to participate
- Existence of water collection and wastewater discharge systems
- Linkage with ongoing initiatives for synergy and collaboration

Once the candidate sites and EST options have been identified, UNEP will convene a meeting during 2005 with Iraqi and international stakeholders to present and discuss the planned activities, and ensure that they are compatible with the ongoing planning of marshland restoration activities.

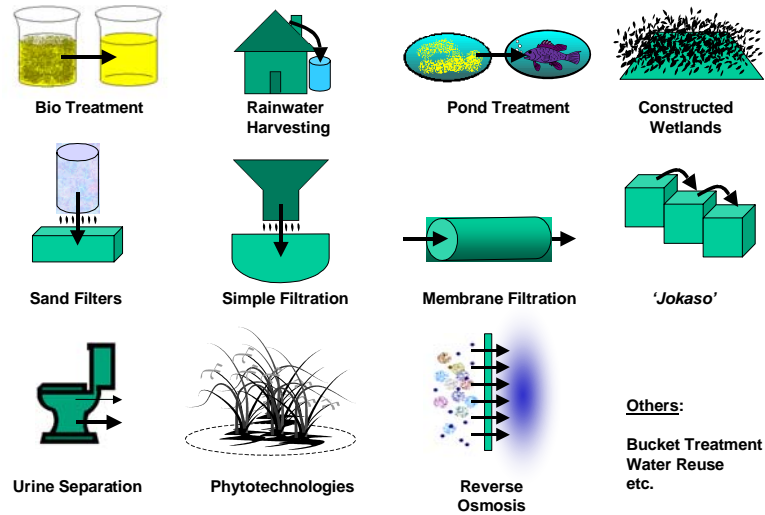


Figure 1: Examples of Environmentally Sound Technologies

The actual pilot implementation is expected to commence during 2005, and will be coordinated by the PIU with guidance from UNEP and UNOPS. Hands-on training will be provided for on-site pilot teams on pilot installations, operations, and maintenance.

The protocol for pilot project assessment and evaluation will be developed and utilized to assess the suitability of the EST options from various angles, including performance, environmental impact, community acceptance, maintenance, and ease of operation. Finally, a monitoring mechanism will be put into place to continue the operation and maintenance of the pilot project technologies, to be coordinated by the PIU.

Component 5: Awareness raising and follow-up

UNEP’s experiences show that the long-term success of pilot applications – and thus the sustainability of the outputs and results of a project – requires the involvement of, and ownership by, the communities. UNEP’s experience further shows that awareness-raising activities are key to ensuring such involvement. Therefore, this project will undertake information dissemination and outreach programmes to inform and involve communities in EST applications. In addition, UNEP believes that broad public understanding of the issues confronting the Iraqi Marshlands and of the programmatic responses to date is critical in two areas: securing further international support for wetlands activities, and securing support within Iraq for moving beyond the pilot stage to broader implementation. Therefore, public relations materials will be prepared and media coverage solicited. Further, two public meetings will be organized to discuss the state of the Iraqi Marshlands and the restoration and management efforts. In these efforts, the project team will develop and disseminate information utilizing a wide variety of media (including audio-visual materials, reports, brochures, and the internet), adapted appropriately to key audiences.

UNEP also expects to consult with stakeholders in the development of a proposal for a second phase of this project. The second phase, which must be demand driven, will build upon the first-phase pilot projects, the lessons learned, and focus on wider implementation. UNEP would seek to mobilize additional international technical cooperation resources for such a second phase.

Development goal and key immediate objectives

The development goal of this project is to support the sustainable management and restoration of the Iraqi Marshlands, with the following immediate objectives:

- To monitor and assess baseline characteristics of the marshland conditions, to provide objective and up-to-date information, and to disseminate tools needed for assessment and management.
- To build the capacity of Iraqi decision-makers and community representatives in the area of marshland management, including: policy and institutional development, technical capability, and analysis.
- To identify EST options that are suitable for the immediate provision of drinking water and sanitation services, as well as wetland management, and to implement them on a pilot basis.
- To identify the needs for additional strategy formulation and coordination for the development of a longer-term marshland management plan based on the results of the pilot project and cross-sectoral dialogue.

The project is expected to raise the basic capacity of communities, institutions, and key personnel in technical and policy aspects of water quality and wetland management. Utilizing such expertise, suitable EST options will be identified and implemented on a pilot basis to meet the urgent need for water and sanitation in a number of marshland communities. Based on these activities, a strategy for the wider application of technical options for marshland management will be developed. The strategy, as well as relevant expertise and knowledge, will provide valuable input for the eventual development of a master plan for the Iraqi Marshlands, and its subsequent implementation by domestic institutions.

Outputs and key activities

Outputs:

- Establishment of a Project Implementation Unit within the Ministry of Environment to address marshland management.
- Implementation of a satellite-based observation system for marshland monitoring and generation of regular real-time reports.
- Establishment of the Marshland Information Network, adequately equipped and with trained users.
- Publication of training materials on wetland management, water quality management, technical analysis and assessment methodologies, available in English and Arabic.
- Establishment of a cadre of trained decision-makers, experts, and community leaders with on-the-ground experience in technical implementation and the policy and institutional aspects of wetland management.
- Pilot implementation of demonstration projects for drinking water supply, sanitation, and wetland management (totalling US\$3 million, plus monitoring and evaluation costs), for the immediate relief of marshland communities.
- Publication of reports on suitable technological options for wider implementation, and analysis of policy and institutional needs to support longer-term management plan development.
- Dissemination of awareness-raising materials on the Marshlands.

Key Activities:

- **Support for strategy development and coordination:** Establishment of the Project Implementation Unit within the Ministry of Environment. Implementation of a policy and institutional survey to establish the current status of marshland management. Organization of a Roundtable on Marshland initiatives with UN clusters, bilateral donors, and Iraqi counterparts, to share information on ongoing activities and establish collaboration and coordination between donors and Iraqi counterparts. Hosting of one donor coordination meeting. Assessment of policy and institutional strengthening for marshland management based on the project results and observations, as a contribution to the development of a longer-term management plan.
- **Data collection and baseline analysis:** Development of a satellite-based marshland observation system to monitor and report on re-flooding and ecological changes. Water sampling, and provision of support for hydrological and biodiversity assessments. Creation of the Marshland Information Network to provide access to data on marshland management activities (in Arabic and English), and establishment of a regional information network with nodes in the southern governorates and at the PIU for information exchange and project monitoring. Equipping of the network and nodes with equipment and providing appropriate training to staff and users.
- **Capacity building:** Provision of training to decision-makers and community leaders on: policy and institutional development, technical capability, and data management and analysis. Study tours of EST implementation sites, and integration of capacity-building initiatives into policy and community action. Support of local training initiatives.
- **Pilot implementation:** On-site training of local teams. Implementation of EST feasibility analysis, selection and assessment to develop a portfolio of candidate options by organizing a meeting with stakeholders. Implementation of suitable ESTs on a pilot scale (including investments of up to US\$3 million), and utilization of trained experts for project implementation. Provision of operations and maintenance support.
- **Awareness raising and follow-up:** Distribution of information materials to raise awareness on the state of Marshlands and the restoration initiatives. Provision of support to community-level initiatives for awareness raising, convening of public meetings, and provision of assistance in developing the second phase of the project, upon request.

Notes

¹ The master plan development tends to be a long-term process that requires consultations and consensus among various stakeholders. While it may include urgently needed actions, development of such a master plan is generally time consuming. For example, the management plan for the Florida Everglades in the United States took approximately 6 years to develop, and entails actions for the next 20 years with budget of US\$8 billion for implementation (Comprehensive Everglades Restoration Plan, 2004). On a smaller scale, the master plan development for Lake Biwa, the largest freshwater lake in Japan, took over 10 years to reach consensus, and entails actions by various stakeholders. For this plan, the coordination and government engagement alone costs approximately US\$1 million per year, not including the costs of the actual lake management measures (Shiga Prefecture, 2000).

² Constructed wetlands are an example of phytotechnology, which is the use of vegetation for environmental benefits such as water quality improvement, remediation of degraded ecosystems, enhancement of biodiversity, improvement of agricultural production, and bioenergy generation. In addition to environmental benefits, its applications can have developmental benefits, providing alternative sources of fuel, forage, and shelter.

Background

The general objective for the workshop is to inform participants about the key elements of integrated water resources management. Once this knowledge is established participants, aided by the trainer's manual developed for this workshop, will be able to raise awareness of IWRM issues amongst various stakeholders.

Environmental Management of the Iraqi Marshlands – Training Kit Series

1. Environmental Management of the Iraqi Marshlands: Water Quality Management
2. Environmental Management of the Iraqi Marshlands: Sustainable Sanitation
3. Environmental Management of the Iraqi Marshlands: Phytotechnology for Wetland Management
4. Environmental Management of the Iraqi Marshlands: Wetland Remote Sensing
5. Environmental Management of the Iraqi Marshlands: EST Assessment Methodology and Implementation
6. Environmental Management of the Iraqi Marshlands: Marshland Information Network
7. Environmental Management of the Iraqi Marshlands: IWRM Policy Integration
8. Environmental Management of the Iraqi Marshlands: ESTs for Drinking Water Provision
9. Environmental Management of the Iraqi Marshlands: Wetland Management.
10. Environmental Management of the Iraqi Marshlands: Community Level Initiative

Table of Contents

Chapter	Page
Acknowledgements	iii
Iraq Project Overview.....	v
Background	xvi
Training Kit Series	xvii
Table of Contents	xviii
Chapter I. Concepts and Strategies in IWRM	1
Chapter II. IWRM and Agricultural Water Supply and Demand	5
Chapter III. Economic Aspects of IWRM.....	9
Chapter IV. IWRM and the Environment	13
Chapter V. IWRM and International Laws.....	17
Chapter VI. Conflict issues in IWRM.....	21
Appendix I	23
Appendix II	27
Appendix III	29

CHAPTER I

CONCEPTS AND STRATEGIES IN IWRM

A Rationale

Water resources are increasingly coming under pressure from population growth, increased economic activity and increasing competition for limited water resources. Worldwide water withdrawals have increased more than twice as fast as population growth and currently one third of the world's population lives in countries that experience medium to high water stress. Pollution is further increasing water scarcity by reducing water usability downstream. Shortcomings in the management of water, a focus on development rather than management and top-down sector approaches to water management continue to result in uncoordinated development and management of the resource.

Integrated Water Resource Management is a process involving the coordination of activities in pursuit of a set of common goals for water resources development and maintenance that account for the social, economic, environmental and technical dimensions.

B Objectives

- Review water-related problems in the Middle East region and in Iraq;
- Define terminology used in the water sector with regard to IWRM;
- Define IWRM concepts and principles;
- Discuss how to implement IWRM;
- Discuss water-related problems in the Middle East region and Iraq within the framework of IWRM.

C Main references and background materials

- ESCWA (2003). *Updating the Assessment of Water Resources in ESCWA Members countries*, UN.
- GWP (2001). *ToolBox for Integrated Water Resources Management*, Stockholm, Sweden.
- Savenije, H. (1999). *Water Resources Management Concepts and Tools*, IHE.

D Suggested internet links

- <http://www.cap-net.org/home.php>
- <http://www.nwp.nl>

E Session topic synthesis – questions for discussion

- Main water-related problems in the Middle East in general and Iraq in particular;
- Definitions of the terminology used in the water sector with regard to IWRM;
- Complexity of IWRM;
- Implementation of IWRM;
- Water-related problems in the Middle East region and Iraq within the framework of IWRM;
- Strategic Issues in Integrated Water Resources Management.

F Summary

1 Water cycle in general

Water on earth exists in different forms. It circulates within the earth's atmosphere and on its surface as a constant volume – i.e. no new water is created. The world's fresh water that is available for human use is only about 0.6% of the total amount of water that is on the planet.

2 Water-related problems in the Middle East region

The overall water problems in the Middle East region can be attributed to the following:

- Natural water scarcity owing to the arid, semi-arid and extremely arid climates;
- Lack of up-to-date information on the quantity and quality of available and potential water resources and of reliable forecasts on water demand;
- The general absence of comprehensive national planning and well-designed policies for water resource exploitation, and use and demand projections with overall socio-economic development plans;
- Lack of awareness in the public sector of the need for the rational use and management of water resources;
- Outdated water legislation and non-existent enforcement mechanisms;
- Fragmented water institutions and ineffective coordination of related water activities at the national level;
- The absence of technical cooperation between countries at the regional or sub-regional level in the exploration and development of new resources, particularly of shared rivers or groundwater basins;
- Lack of adequate financial resources to efficiently develop non-conventional water resources, particularly desalination and wastewater reuse facilities, as well as hydraulic structures and distribution systems.

3 Definition of IWRM

Several definitions of Integrated Water Resources Management are used. Some have been developed by the World Bank, USAID, the Global Water Partnership (GWP), and others. However the most common aspect of all the available definitions is that IWRM is a process involving the coordination of activities in pursuit of a set of common goals for water resources development and maintenance that account for the social, economic, environmental and technical dimensions.

4 Guiding principles

The International Conference on Water and the Environment (JCWE) in Dublin (1992), after long deliberations, issued what became known as the Dublin Principles. These have played an important role in stimulating reforms in water management. The following (along with many associated key concepts) are the four guiding principles:

- 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.

5 How to implement IWRM

IWRM may be implemented at several levels within a country and region. The three main components essential in the implementation process are:

- Developing and maintaining an Enabling Environment, which is a set of legislations and regulations that allows institutions and stakeholders to play a role in the process;
- Setting up appropriate Institutional Roles, which involves creating organizational frameworks that allow the implementation and monitoring of the process;
- Developing and using Management Instruments and Tools to ensure the proper implementation of the process.

The previous steps all lead to a key issue: Good Water Governance. Water governance is the range of political, social, economic and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels of society. The main reason for concluding with this segment is that the water crisis is essentially a crisis of governance and more essentially water governance is key to sustainable development.

CHAPTER II

IWRM AND AGRICULTURAL WATER SUPPLY AND DEMAND

A Rationale

Agriculture production consumes from 70% to 80% of the available water resources in arid and semi-arid regions, and Iraq falls in this category. The average water requirements for crop production range from 8000 to 12000m³/hectare; depending on the climate, date of planting, kind of crop and its length of the growing season, and the irrigation method that is being used. Improving irrigation application efficiency will contribute to water conservation at the farm level but it needs capital investment, i.e. to shift from a non-pressurized irrigation system (gravity) to a pressurized irrigation system (sprinkler and trickle irrigation). More importantly one should understand the soil-water-plant-climate interaction in order to determine and answer the two basic questions: when to irrigate and how much to apply at each irrigation event. On the other hand, and with the globalization, it is worth looking at water productivity (monetary value per unit of water), growing crops with high water productivity, and importing crops with low water productivity bringing about the import of Virtual water.

B Objectives

- To reduce pollution of water resources by improving irrigation efficiency;
- To reuse wastewater and drainage water by cultivating salt-tolerant crops in marginal or low-quality water regions;
- To increase the import of virtual water by optimizing water productivity.

C Main references and background materials

- Bureau of Reclamation (2000). Achieving Efficient Water Management: A Guidebook for Preparing Agricultural Water Conservation Plans, available at <http://www.usbr.gov/waterconservation/publications.html> accessed August 15, 2003.
- ESCWA (2003). Updating the Assessment of Water Resources in ESCWA Members countries, UN.
- ESCWA (2003). Sectoral water allocation policies in selected ESCWA member countries, UN.
- FAO (1984). Crop Water Requirements. FAO Irrigation and Drainage Paper No. 24, Rome.
- FAO (1997). Irrigation potential in Africa. A basin Approach. FAO Land and Water Bulletin 4, Rome. - FAO (2002) World Agriculture towards 2015/2030, Rome.
- UNESCO/WWAP (2003). World Water Assessment Programme; The United Nations World Water Development Report; Chapter 8 Securing Food for a Growing World Population; www.unesco/water/wwap, UNESCO/Bergham, Paris.
- UNESCO (2004). *ETHICS IN WATER; Chapter 5. Water for Agriculture*; Monograph; Paris.
- World Water Council (2000). *A Vision of Water for Food and Rural Development*.

D Suggested internet links

- <http://www.worldwatercouncil.org/Vision/Documents/WaterforFoodVisionDraft2.PDF>
- <http://www.worldwatercouncil.org/Vision/Documents/WaterforFoodVisionDraft2.PDF>
- <http://www.fao.org/agl/aglw/aquastat/main/>

- <http://www.apps.fao.org/>
- <http://www.usbr.gov/waterconservation/publications.html>
- <http://www.cgiar.org/iwmi/>

E Session topic synthesis – questions for discussion

- When to irrigate?
- How much to irrigate?
- Which irrigation methods are better to use?

F Summary

The workshop started by defining and understanding the two main questions: when to irrigate and how much to apply at each irrigation event.

1 How much to irrigate?

In order to answer this question we have to understand the main factors that affect crop water consumption. These factors are:

- Climate, i.e. temperature, radiation, wind speed, precipitation and relative humidity;
- Crop, i.e. kind of crop, its root depth, length of the growing season, the length of the different growth stages and its crop factor in each growth stage;
- Soil, i.e. type of soil and its physical and chemical properties, its available water between field capacity and permanent wilting point, and its infiltration or intake rate;
- Water, i.e. water quantity and water quality.

Climatic factors will determine the potential evapotranspiration needed to put the crop in equilibrium with its microclimate. This can be achieved by using the UNFAO modified Penman-Monteith model as described in the FAO Irrigation and Drainage papers numbers 24, 33, 46, and 56. Paper 46 is a guideline and gives step-by-step instructions on how to use the FAO software CROPWAT, which is based on using climatic and crop data to calculate potential evapotranspiration and crop evapotranspiration of one crop or multiple crops. Also, its output gives irrigation schedules and required flows per hectare for irrigation based on preset irrigation efficiency. CROPWAT can also calculate the effective precipitation (and deduct it from the needed water requirement) to calculate the net irrigation requirement (NIR). After calculating the NIR the gross water requirement is calculated depending on the efficiency of the system and leaching requirement (LR). The LR depends on the quality of the irrigation water (EC is the electrical conductivity) and on the EC of the soil or the EC that the crop can resist without hindering its yield production.

2 When to irrigate or irrigation interval?

The irrigation interval and/or the scheduling of irrigation depend merely on the soil water-holding capacity (in the vicinity of the crop roots) and the daily evapotranspiration. It is the ratio of the NIR divided by the actual crop evapotranspiration (ET_c) of the crop under consideration. If we apply more water than the soil can hold in the root zone then we will be wasting water and reducing the efficiency. Therefore, it is important to know the ET_c of each crop at each growth stage and to know the root depth of the crop. Moreover, for better crop production it is not advisable to let the plant extract all the available water till the soil reaches permanent wilting point; this might cause a reduction in crop yield. Therefore, we introduce an allowable soil moisture depletion factor (ASMD). The ASMD values, as a rule of thumb,

can be considered 50% for deep-rooted crops (root depth more than 50cm), and 30%-35% for shallow-root crops (root depth less than 50cm). This ASMD, when multiplied by the total available water, will give the right NIR to be applied; this right NIR divided by the ET_c of the crop will yield the right irrigation interval.

The second part of the workshop was focused on the irrigation methods that can be used to improve the on-farm irrigation efficiency and application efficiency. The irrigation methods can be divided into two main categories:

- Non-pressurized irrigation systems or gravity systems: In this system the land should be levelled or graded with low intake rates. This system includes:
 - Flood irrigation system: It is an old system and a very inefficient way of applying water to crops. Its overall irrigation efficiency is less than 40%. So besides wasting water, it is a source of pollution for surface and groundwater with the dissolved chemicals that might be carried with runoff and in deep percolation.
 - Border irrigation system: It is good for field crops and the soil surface needs to be graded and smoothed to achieve an irrigation efficiency of about 60%. It is labour intensive and needs good management practices.
 - Basin irrigation system: It is a modification of the border system. The basin can be small or large depending on the crops and the degree of mechanization used. Its efficiency can be as good as 65% with proper irrigation management practices.
 - Furrow irrigation system: This works well when applied on row crops. To achieve a good irrigation efficiency of 65% or more the furrows should be graded.

For all the above systems, the inlet flow should be large enough not to cause soil erosion. The soil intake rate should be moderate to high in order for the water to reach the end of the field within the shortest possible time. It is not advisable to use the above methods on shallow soils, where the available water flow is small and/or irrigation intervals are short. One advantage of the above systems is that they are not affected by high winds.

- Pressurized irrigation: Under this category we have both sprinkler and trickle or localized irrigation.
 - Sprinkler irrigation system: These are overhead irrigation systems. The most important factor in choosing a sprinkler system is to have the application rate of the systems equal or less than the final infiltration rate of the soil. This irrigation system can be used on all terrains. The land does not need levelling. The disadvantages of these systems are that they are affected by high winds, and need high pressure for operation. If the quality of water is good they can be used on all crops. Under this system we have the centre pivots, the rain gun, the permanent, the solid, and the hand-moved sprinkler irrigation systems. Their overall application efficiencies range from 75% to 90% if properly designed and selected.
 - Trickle irrigation and/or localized irrigation systems: In these systems the water is applied to wet part of the soil; usually the wetted area is 30% to 50%. Their overall application efficiency is greater than 90% if properly managed and maintained. They are not affected by wind or the quality of the water because they drop water directly on the soil surface and in the vicinity of the roots. With poor-quality water management the focus should be on the build-up of salts along the periphery of the wetting zone. They need extensive filtering to minimize the clogging of outlets or emitters. The pressure required is less than (almost <50%) that required for sprinklers.

The types of localized irrigation system are: drip irrigation, bubbler-basin irrigation, and micro irrigation systems.

In both sprinkler and trickle irrigation systems, fertigation and chemigation can be practised with high distribution uniformity, which is equal to the distribution uniformity of the irrigation system.

CHAPTER III

ECONOMIC ASPECTS OF IWRM

A Rationale

Water is a unique commodity with multidimensional aspects, i.e. technical, engineering, economical, political, religious, etc. It is also an essential and basic need for life. Because of the multidimensional features of water, the true cost of water utilization, in a given use and among alternative uses, is rarely fully and accurately assessed. Consequently, the true value and the real price of water are frequently undermined. Current markets of other goods seldom exist in water resources, which makes water a classical example of a non-market commodity.

The vast alternative uses of water amongst and within different sectors; agricultural, industrial, municipal, etc, increase the commonality feeling among different users and thus create incentives to consume the water resources before other do, which results in overuse or depletion of the resource. The overuse contributes to the problem of water scarcity that many places in the world face and thus intensifies the scarcity problem. In addition, the common property feeling usually leads to the problem of “tragedy of common” in water resources. It is a “tragedy” because it would be in the interest of all if everyone were to conserve; yet all end up overusing and depleting this vital resource.

The problems of cost assessment and the tragedy of common, underscore the importance of considering the economic aspects in water resources allocation and use. The decision makers and the technical staff that deal with water resources management should definitely consider the economics of water to ensure the “best” allocation and the “optimal” use in each allocation. Therefore, technicians and decisions makers of water management should be familiar with how to assess the true cost of water resources in different uses. In addition, they should be able to assess and appraise alternative water resources projects to ensure the proper selection among these projects, if maximum economic returns of water were to be considered as one of their objectives.

The final part deals with the principles and techniques for cost structure and analysis, followed by a project introduction to project analysis and appraisal.

B Objectives

- To introduce the economic cost concepts of water-related issues to the Water Resource Managers (WRMs);
- To familiarize the WRMs with the cost structure and analysis;
- To present to the WRMs different techniques of cost assessment;
- To introduce the principles of the time value of money for investment analysis;
- To familiarize the WRMs with the project cycle and components;
- To introduce the different discounted project techniques for analysing and appraising water resource projects;
- To acquaint the WRMs with economic decision criteria for project selections based on economic profitability.

C Main references and background materials

- Cramer GL, Jensen CW and Southgate D (2001). *Agricultural Economics and Agribusiness*. John Wiley and Sons Inc., Eighth Edition.
- ESCWA (2003) *Updating the assessment of water resources in ESCWA*.
- ESCWA (2001). *Current water policies and practices in selected ESCWA member countries*, E/ESCWA/ENR/1999/15.
- Gittinger JP (1982). *Economic Analysis of Agricultural Projects*. The Johns Hopkins University Press, Baltimore and London, Second Edition.
- Kay RD and Edwards WM (1999). *Farm Management*. McGraw Hill Book Co., Fourth Edition.
- Sassone PG and Schaffer WA (1978). *Cost-Benefit Analysis: A Handbook*. Academic Press, New York.
- Spinner MP (1997). *Project Management: Principles and Practices*. Prentice-Hall Inc., Columbus, Ohio.

D Suggested internet links

- <http://www.gwpforum.org/gwp/libarary/FinPanRep.pdf>

E Session topic synthesis – questions for discussion

- How do you make your decision concerning the water allocation issue in your country?
- Will water costing, pricing and charging be common practices in your country? How?
- What do you know about economic costs and opportunity costs for water allocation?
- What is a project?
- What are the project components?
- How do you plan for water allocation and management issues in your work?
- How would you accept a project based on the economic profitability and select the project(s) from many others?

F Summary

Water is a complex commodity that can be found in various phases (vapour, liquid and solid) and in different consumption forms (raw, intermediate and final). Added to that, it has different aspects related to technology, economics, social, etc. All of which has led to the situation of market imperfections or even non-market existence for water resources. Nevertheless, with the continuous increase in water scarcity due to the relative fixed supply and the continuous increase in demand for water due to population growth and changing lifestyle patterns, the need to emphasize the economic dimension of water-related uses is becoming an inevitable requirement when policies for optimal water allocation and use are drawn up. Thus, decision-makers and water resource managers should become acquainted with the various principles and techniques of water costing, cost analysis, and investment analysis for water-related projects. In addition, they should be familiar with the different techniques of project analysis and appraisal, in order to be able to compare different water use alternatives and select the most efficient ones.

This section contains two parts. The first consists of two interactive lectures using a PowerPoint presentation format. The second consists of group work exercises for the participants to apply the concepts addressed in the first part.

The first presentation is entitled “Cost Concepts and Analysis”. In this lecture, the economic concepts of costs are presented, followed by the costs classification and structure. The presentation then discusses components of the fixed and variable costs, and how they can be estimated/calculated for a given asset of water-related projects. The concept of the time value of money and compounding versus discounting techniques are then presented and discussed. Finally, the lecture ends with structuring and analysing the cost of a given investment.

The second presentation is entitled “Project Analysis and Appraisal”. This lecture deals with the project definition, components and cycle. Then cost benefits analysis techniques are presented including both non-discounted and discounted techniques. After that, the project’s profitability indicators based on discounted techniques are discussed in depth: mainly Benefit-Cost Ratio (BCR), Net Present Value (NPV) and Internal Rate of Return (IRR). During the presentation practical examples of water projects are given of how to calculate each of the BCR, NPV and IRR of a project. The interdependency among projects and how it can impact the profitability of these projects is then explained. The presentation ends with a summary of a formal decision tree for accepting projects, in the case of only one project or a set of projects.

The day ends with practical (applications) exercises that deal with all the relevant concepts and issues presented earlier. The participants are to form groups and work out the applications in these groups. The day ends with a wrap-up discussion of the issues addressed during the day with the participants’ feedback about the relevant importance of each one.

CHAPTER IV

IWRM AND THE ENVIRONMENT

A Rationale

Water resources are an integral part of the environment and the efficient management of such resources has become crucial due to unsustainable consumption, and poor management and allocation of water. EIA and SEA can be used as tools to help integrate water management in environmental management.

B Objectives

- Explain the concept of environmental impact assessment;
- Explain the concept of strategic environmental assessment;
- Explain the differences between the two concepts;
- Where and how to use either or both approaches.

C Main references and background materials

- Elfadl K. and El-Fadel M. Comparative assessment of EIA systems in MENA countries: Challenges and prospects. *Environmental Impact Assessment Review*, 24, 6, 553-593, 2004.
- World Bank. 1999b. *Case Studies on Regional and Sectoral EA: An Analysis of Lessons Learned*. Report Prepared by Environmental Resources Management for the World Bank. Environment Department, World Bank, Washington D.C., USA.

D Suggested internet links

- European Commission. 2003. Strategic Environmental Assessment and Land Use Planning in Lebanon [Online]. Available: http://europa.eu.int/comm/environment/life/project/Projects/index.cfm?fuseaction=SEARCH.CREATEPAGE&s_ref=LIFE00%20TCY/INT/021&area=3&yr=2000&n_proj_id=1797&CFID=42415&CFTOKEN=20370841 [June 16, 2003].
- IAIA (International Association for Impact Assessment). 2003. Background and Purpose of IAIA [Online]. Available: www.iaia.org (June 10, 2003).
- World Bank. 2001a. Middle East and North Africa Region Environment Strategy Update (Draft) [Online]. Available: [http://wbln0018.worldbank.org/essd/essd.nsf/GlobalView/MENAstrategy.pdf/\\$File/MENAstrategy.pdf](http://wbln0018.worldbank.org/essd/essd.nsf/GlobalView/MENAstrategy.pdf/$File/MENAstrategy.pdf) [November 15th, 2002].
- World Bank. 2001b. Environment Matters 2001 [Online]. Available: [http://lnweb18.worldbank.org/ESSD/essdext.nsf/41DocByUnid/A58D97DBDB9CAE9685256C1E005EAE21/\\$FILE/EM2002MiddleEastAndNorthAfrica.pdf](http://lnweb18.worldbank.org/ESSD/essdext.nsf/41DocByUnid/A58D97DBDB9CAE9685256C1E005EAE21/$FILE/EM2002MiddleEastAndNorthAfrica.pdf) [August 20th, 2002].

E Session topic synthesis – questions for discussion

- What is an EIA?
- What is an SEA?
- What are the differences between EIAs and SEAs?

F Summary

1 EIA

EIA consists of a set of procedures that ensure environmentally sound and sustainable development options, recognizing any environmental consequences early in the design phase. The objectives of EIA are to:

- provide a sound basis for decision making about the design of project components;
- ensure that the project is implemented with full awareness of environmental factors;
- inform the public when and how the project implementation may affect the environment;
- facilitate public participation in the decision-making process.

The project EIA timescale in EU is usually less than 2 years: EIA studies need 6–12 months, report preparation needs 2–3 months, and review and decision making need 3–6 months. The cost of EIA is usually 1–2% or less of the total project cost. The cost depends on the size of the project, the availability of baseline information, availability of expertise to carry out the EIA, location of the project, economic, cultural, social and ecological conditions. EIA costs are usually paid by the proponent, government or public stakeholders. There are many benefits to conducting an EIA: better compliance with standards, increased project acceptance, avoids later adaptations, more environmentally sustainable design, and savings in capital and operating costs.

The EIA process includes the following stages:

- Screening: determines whether or not a project requires a full-scale EIA and the level at which this assessment should occur. There are three possible screening outcomes: a full scale EIA is required, limited environmental assessment required, no further environmental analysis required.
- Scoping: the objective is to consider practical alternatives, inform potentially affected people, identify possible effects, understand local values, define boundaries of the EIA, define analytical methods, and establish the terms of reference etc.
- EIA preparation:
 - Legislation: legislative framework should include regulations and standards on environmental quality, health and safety, protection of sensitive areas, protection of endangered species, siting criteria, and land use control.
 - Project description and baseline: project description should include the design (size, capacity), preconstruction activities, operation and maintenance, life expectancy, schedule/staffing, location, and layout of facilities. Baseline data should contain information on the physical, biological and socio-cultural environment.
 - Impact assessment: impacts may include employment opportunities, wastewater effluents, air emissions, and traffic etc. It is important to distinguish between positive and negative impacts, immediate and long-term impacts, direct and indirect impacts, and other types of impacts. Impacts are identified by checklists and matrices, networks and overlays and GIS, and expert systems and professional experience. They are later analysed with methods of professional judgement, quantitative mathematical models, experiments and physical models, case studies and qualitative comparison.
 - Analysis of alternatives: alternatives can include a “no action” alternative, upgrading existing facilities, routes, design, or applying other methods of construction.
 - Mitigation plan: mitigation measures seek to find better ways of doing things, minimize or eliminate negative impacts, and protect public and individual rights to

- compensation through alternative ways of changing in the project plan and design, improving monitoring and management, or replacing, relocating, and rehabilitating.
- Monitoring plan: identifies the parameters/activities to be monitored, monitoring means (sampling methodologies), location, frequency, phase (construction/operation), responsibility, and cost of monitoring.
- Institutional strengthening: authority and capability of institutions are reviewed and recommendations such as new laws and regulations, new agencies, training etc. are provided accordingly.
- Reporting: the EIA report should incorporate the policy, legal, and administrative framework, description of the proposed project and environment, assessment of impacts, analysis of alternatives, environmental management plan (which includes the mitigation plan, monitoring plan, and the management plan and training), public participation, and other relevant parts.
- Reviewing: determines whether the EIA report is an adequate assessment of the environmental effects and is of sufficient relevance and quality for decision-making.
- Decision-making.
- Follow-up monitoring: the purpose of this is to document initial baseline conditions, review accuracy of impact prediction, verify effectiveness of mitigation, and look for improvements to future EIAs.

2 SEA

SEA is a systematic process for evaluating the environmental effects of proposed policies, plans, or programmes in order to ensure they are fully included and appropriately addressed at the earliest stage of decision-making, at the same level with economic and social considerations; this includes the preparation of a written report on the findings of the evaluation and using the findings in publicly accountable decision-making. SEA aims at strengthening and streamlining project EIAs, and promoting sustainable development. Costs of SEA (which arise from staff time, expert advice, publicity, and publications) are borne by the public whereas costs of EIA are borne by the promoter.

The SEA process is similar to the EIA process with the following stages:

- Screening is necessary in SEAs. It defines the need for an SEA and the type of SEA to be undergone (regional, sectoral, or national).
- Scoping differs according to the level of planning, type of SEA, objectives, where it is being carried out and by whom.
- Impact assessment. Impacts in SEA can be divided into large-scale, cumulative, synergistic, and indirect impacts.
- Reporting: the report should include an executive summary, the decision-making framework, environmental baseline, objectives of the plan, summary of the proposed plan, analysis of alternatives, environmental impacts, environmental protection measures, report of consultation and participation, analysis of uncertainty, and finally the environmental action and monitoring plan.
- Review.
- Decision-making: different levels at which policies, plans and programmes are made and variation in the structure of government. No standardized methods for decision-making exist.
- Implementation and monitoring: monitoring is needed to evaluate the effects of policies, plans and programmes and identify further studies and modifications.

Public participation is very important in both EIA and SEA processes. Typical stakeholders include the local people, the proponent and beneficiaries, government agencies, NGOs, donors, and the private sector. The objectives behind public participation are to acquire local knowledge, to inform stakeholders, and for better transparency and accountability in decision-making. The general public is much less involved in SEA due to different reasons, among those: confidentiality requirements, lack of adequate tools and mechanisms, lack of experience and good examples, etc.

3 Difference between EIA and SEA

EIA	SEA
Represents an end	Leads to a strategy
Goals and objectives are predetermined	Set in context of broader vision, goals and objectives
Forecasts	Backcasts then forecasts
Asks “what are the impacts of our option?”	Asks “what is the preferred option?”
Project specific	Not project specific
Reactive	Proactive
Narrow focus and highly detailed	Broad focus and low level of detail
Narrow spatial scale	Wide spatial scale
Short time interval	Lengthy time interval
Alternatives are easily differentiated	Alternatives are abstract

EIA is important in MENA countries due to the presence of environmental issues such as water scarcity and quality, land degradation and desertification, coastal degradation, urban and industrial pollution. These issues are aggravated by weak regulatory and enforcement mechanisms. Description evaluation criteria are based on formal requirements for EIA and on elements of its practice: systemic measures and foundation measures. The main weaknesses found in MENA countries relate to the lack of explicit legislation and legislated environmental quality standards, weak regulatory enforcement, highly centralized, understaffed and low-budget authorities, lack of uniform requirements for EIA report content, absence of EIA system monitoring etc. It is recommended that countries should enact enabling legislations if they are lacking them, devise EIA regulations if they are lacking them, incorporate absent EIA process components, strengthen review and quality assurance, and carry out institutional strengthening and capacity building.

CHAPTER V

IWRM AND INTERNATIONAL LAWS

A Rationale

IWRM is contingent upon the instigation of an effective legal framework that is based on the prevailing international legal norms accepted by the international community. Indeed, as the demand for water rises and shortages worsen in the Arab region, the potential for conflict over water resources continues to increase. It is therefore vital that the countries in the Arab region further improve cooperation regarding shared water use, development, and management. International water law (which includes both surface and groundwater) plays a leading role in solving water conflicts and reducing the associated risks of war and pollution. Core principles such as “equitable utilization” and the “no-harm” rule should therefore be understood and applied by all in the region.

B Objectives

- To provide some key concepts in public international law and international relations that are relevant to understanding the evolution of international water law.
- To introduce the main international water doctrines that serve as the political basis for most national policies with regard to shared water resources.
- To critically analyse and discuss the scope and principles that emerged from the 1966 Helsinki Rules and the 1997 UN Water Convention.
- To analyse the differences between the international law pertaining to surface water and groundwater respectively.

C Main references and background materials

- Birnie and Boyle (2002). *International Law and the Environment*. Oxford University Press, 2nd ed., New York.
- Brown-Weiss et al (1998). *International Environmental Law and Policy*. Aspen Law & Business, New York.
- Cassese A (2001). *International Law*. Oxford University Press, Oxford.
- ESCWA (2002). *Assessment of Legal Aspects of the Management of Shared Water Resources in the ESCWA Region*. United Nations, New York.
- ESCWA, BGR, GTZ (2004). *Manual for ESCWA Member Countries on Dispute Resolution of International Water Resources*. United Nations, New York.
- McCaffrey S (1996). The Harmon Doctrine One Hundred Years Later: Buried, Not Praise. *Natural Resources Journal* 36, No. Summer.
- McCaffrey S. “International Water Law for the 21st Century: The Contribution of the UN Convention”.
- Sands P (2003). *Principles of International Environmental Law*. Cambridge University Press, 2nd ed., Cambridge.
- Sitt T, “Evaluating the Preliminary Draft Articles on Transboundary Groundwaters” Presented by Special Rapporteur Chusel Yamada at the 56th Session of the ILC Convention, May 2004.

D Suggested internet links

- <http://www.internationalwaterlaw.org/>
- <http://www.giwa.net>
- <http://www.thewaterpage.com/policyandlaw.htm>
- <http://www.asil.org/resource/home.htm>
- <http://www.nilebasin.org>

E Session topic synthesis – questions for discussion

- What are the main sources, and who are the main subjects of public international law?
- What is the difference between a treaty and a framework convention?
- What is “soft law” and how is this relevant to international water law?
- Explain the differences among the three main international water doctrines. What doctrine would upper and lower riparians be likely to cling to?
- Why does the Harmon Doctrine retain such a powerful logic in the current international order, particularly in the Middle East?
- What is the scope of the UN Water Convention? Explain why it has not come into effect yet and what the implications are for this.
- What are the main principles that the Helsinki Rules and the UN Water Convention espouse? Do the Helsinki Rules and UN Water Convention differ to a great extent?
- What is international groundwater law, and why has its development been so controversial? Should we consider surface water and groundwater to be one system under international law?
- Analyse (a) the Jordan River case and (b) the Nile River case: what doctrines do each of the Riparians hold in each case? Which UN Water Convention principles do you think should be applied in these cases?

F Summary

There are two constants that must be considered when it comes to discussing water issues, particularly in the Arab region. The first is that water demand continues to grow quite dramatically. The second is that this demand, coupled with ever-increasing populations, has placed great pressure on what is ultimately a finite natural resource: water. Indeed, water in the Arab region is especially scarce, with most of the region’s annual renewable water sources provided by river flows from outside the region and many of the major aquifers in the region are shared between two or more countries. Most Arab countries depend for their water supply on rivers and/or aquifers that are shared with neighbouring countries. Shared surface water resources are becoming increasingly exhausted, in terms of quality and/or quantity. As a result, shared groundwater has become more important and over time it will become further polluted or over-utilized.

International water law (along with the corresponding institutions) provides the basic mechanisms and procedures for negotiating the necessary rules and standards, settling disputes, and supervising implementation and compliance with treaties and custom. It also regulates environmental problems, setting common international standards and objectives for prevention or mitigation of harm; and harmonizes national laws regionally and globally. However, as with all public international law, international water law is difficult to enforce (because of the anarchical nature of the international order whereby there is no world government that has authority over all states) and does not have any binding character unless it is based on state consent, usually expressed via international treaties (the primary source for

all international law), though sometimes via customary law or general state practice. Judicial decisions, such as those taken by the International Court of Justice, are important but are secondary sources of international law. Non-traditional sources of international law are known as “soft law” because they are non-binding, and include the body of standards, commitments, joint statements or declarations of policy or intention, or resolutions adopted by the UN General Assembly or other multilateral bodies (such as Agenda 21 or the World Summit on Sustainable Development Plan of Implementation). Despite its non-binding character, however, such “soft laws” have become increasingly important in recent times as they are generally indicative of the modern trends of water law emerging in the world community and they often form the building blocks for more binding “hard” law as it becomes more politically feasible.

In general, three main international water doctrines have emerged over the past two centuries, each reflecting the political interests of a particular (sovereign) state. The first, called Absolute Territorial Sovereignty or the Harmon Doctrine, is favoured by upper riparians. It is based on the stubborn notion of unrestricted state sovereignty whereby each state may claim the right to do whatever it chooses with the water flowing in its territory, regardless of its effects on other riparian states. This doctrine has over time been discredited and rejected by international jurists and international organizations, though a number of states (including some in the Middle East) continue to hold on to it for political purposes. The second doctrine is that of “Absolute Territorial Integrity” and is favoured by lower riparians. Under this doctrine, no state may utilize the waters of an international river in a way that might cause detrimental effects on a co-riparian’s territory. Although Egypt used this rationale during its dispute with Sudan over the Nile waters, it has also been rejected by international jurists and organizations. Finally, the doctrine of Restricted Sovereignty – or “community of interests” – is rooted in the classic maxim, “use what is yours so as not to cause harm in others”. It thus acknowledges every co-riparian’s right to use the shared waters within each state’s own territory while restricting such sovereignty by obliging each state to consider the rights and interests of co-riparians when utilizing the shared water. With its emphasis on the mutual development of a river’s water by the riparian states, and the promotion of common interests of all riparians, this principle has been embraced by international law and serves as the basis for most successful treaties and conventions.

As for international water law principles, three main international bodies have helped develop them over the past century: The Institut de Droit International (IIL), the International Law Association (ILA), and the UN International Law Commission (ILC). In 1966, the ILA established what came to be known as the “Helsinki Rules” on the uses of waters of international rivers. It was the first attempt by any international organization to codify the entire law of international watercourses, and it continues to be accepted as one of the most authoritative, used by scholars, courts and donor agencies. In 1970, the UN General Assembly (GA) recommended that the ILC (which serves as a bridge between scholars and the GA’s Sixth Committee, where laws are developed) study the international law of watercourses further. By 1994, the ILC had submitted its work to the GA and three years later the UN Convention on the Law of the Non-Navigational Uses of International Watercourses (“UN Water Convention”) was adopted. This framework convention defines a “watercourse” as a “system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus”. The convention contains a number of key international water principles, such as:

- **The principle of equitable utilization**, whereby each state is entitled to the use and benefit from the watercourse in an equitable (note: not equal!) manner, according to such criteria as:

- socio-economic needs and population size of each state;
 - various geographic, hydrographic, hydrological, climatic ecological factors;
 - existing or potential use of watercourse;
 - conservation, protection, development and economy of use of water resources; and costs of such measures;
 - availability of alternatives of particular planned or existing uses.
- **The no-harm principle**, whereby all states must take all appropriate measures to prevent causing “significant harm” to other watercourse states.
 - **The prior notification principle**, whereby each state must provide a “timely” notification and environmental impact assessment before implementing a planned measure which may have a “significant adverse effect” upon another state.

The UN Water Convention also forbids the destruction of international watercourses and related installations during armed conflict, and requires that all watercourse states protect and preserve the ecosystems of international watercourses. However, and despite its continued relevance as the most up-to-date expression of international water law, the UN Water Convention has not entered into force because not enough states have ratified it.

Ultimately, however, IWRM is concerned with all water sources, and the main deficiency of the UN Water Convention is its neglect of groundwater. The very definition of watercourse in the convention explicitly excludes all groundwater that is “confined” (i.e. not connected to surface water). Groundwater plays an ever-increasing role in fulfilling the world’s water needs, with over 97% of potentially available freshwater in underground aquifers. Today, over 50% of the world’s population depends on groundwater to fulfil its basic needs. Therefore, recent significant contributions of the ILA (which established the 1986 “Seoul Rules”) and other authoritative bodies and rulings (e.g. the Bellagio Draft Treaty) indicate clearly that there is a growing recognition that the basic international water laws should cover groundwater in the same way that they cover surface water. What remains missing is an international treaty that recognizes this in a manner that is binding on all states.

CHAPTER VI

CONFLICT ISSUES IN IWRM

A Rationale

Water resources have been the source of political tension across continents including the Middle East, a region renowned for its arid climate and water scarcity. A multitude of economic, social, cultural, environmental and political issues govern current water sharing policies in this region, where politics appears as the most prominent and influential factor for water allocation. In fact, water allocation along international rivers in the region is largely determined by political power. Past and recent experiences indicate that the complex and politically sensitive issues of international watersheds cannot be resolved unilaterally, but rather require a genuine cooperation and commitment between countries in addition to an understanding and acknowledgement of each other's needs. This section presents adjustments at the national and international levels, geared towards the resolution of water disputes in the Middle East with the ultimate goal of promoting regional consensus for the integrated development of various watersheds.

B Objectives

- Explain water conflict and the ways of management.
- Relate water conflict management to the Euphrates-Tigris basin.

C Main references and background materials

- El-Fadel M., El-Sayegh Y., Abou Ibrahim A., Jamali D., and El-Fadl K. The Euphrates-Tigris basin: A case study in surface water conflict resolution, *Journal of Natural Resources & Life Sciences Education*, 31, 99-110, 2002.
- El-Fadel M. and Elfadl K. Water in the Middle East revisited: Conflict management alternatives. *Water Policy*, 7, 4, 2005. (in press).

D Suggested internet links

- Allan, T. (1998). Global Soil Water: A Long-Term Solution for Water Short Middle Eastern Countries? [Online]. Available: <http://www.gci.ch/GreenCrossPrograms/waterres/middleeast/allan.html> [January 12, 2003].
- Charrier, B., Dinar, S. and Curtin, F. (1999). Water, Conflict Resolution and Environmental Sustainability in the Middle East [Online]. Available: <http://www.gci.ch/GreenCrossPrograms/waterres/water/waterconflictresolution.html> [December 25th, 2002].
- Hiniker, M. (1998). Averting A Water Crisis in the Middle East: Make Water A Medium of Cooperation Rather than Conflict: Report of a Workshop Held in Paris on 18 March 1998. [Online] Available: <http://www.gci.ch/GreenCrossPrograms/waterres/middleeast/waterintro.html> [January 12th, 2003].
- Samson, P. and Charrier, B. (1997). International Fresh Water Conflict: Issues and Prevention Strategies [Online]. Available: <http://www.gci.ch/GreenCrossPrograms/waterres/gcwater/study.html> [January 13th 2003].

- Wolf, A. (2001). Transboundary Waters: Sharing Benefits: Lessons Learned [Online]. Available” http://www.water-2001.de/co_doc/transboundary_waters.pdf [July 5th, 2003]. International Conference on Freshwater, Bonn, 2001.
- Zaslavsky, E.D. (2000). Definition of Israel’s Water Problems [Online]. Available: <http://www.biu.ac.il/SOC/besa/water/zaslavsky.html> [July 3rd, 2003].

E Session topic synthesis – questions for discussion

- What are the reasons that lead to water conflict?
- How can cooperation and joint action solve water conflict?
- How can the water conflict in the Euphrates-Tigris basin be solved?

F Summary

Potential for water conflict occurs in regions wherever several freshwater resources are shared by more than one country. The type and severity of the conflict depend on the region while the extent of the conflict may be affected by the type of watercourse. Three main issues may lead to water conflict: freshwater quality and quantity problems, and political dispute. Several indicators can be used to ‘predict’ the type and intensity of potential conflict: geopolitical setting, level of national development, hydropolitical issue at stake, institutional control of water resources, national water ethos, and water availability.

Countries sharing international rivers face a two-dimensional problem: holistic management of water resources and water resource sharing. Management measures should be at both the national and regional level. At the national level, institutional strengthening, policy reform, and inventory updates can lead to better water management. On the regional level countries should build trust through exchange of information, access to plans, awareness campaigns, and integrated basin management among other things. Therefore cooperation and joint action between the countries is very crucial. The Euphrates-Tigris basin, which has witnessed a long history of conflict, represents a relevant case study in water conflict since the rivers are shared by all of Turkey, Syria, and Iraq.

Appendix I Sample Training

1. Programme and Timetable (Sample)

Training Course on Integrated Water Resource Management: Policy and Integration				
Date		4-9 April 2005		
Venue		Bristol Hotel, Amman, Jordan		
Course Leader		Dr. Nadim Farajalla, Assistant Professor, American University of Beirut (AUB)		
Facilitator				
Date	Time	Content of Lectures & Activities	Lecturer(s) and organization(s)	
4	Mon	AM	Opening ceremony Orientation and project overview	UNEP IETC, UNEP-PCAU, Japanese Embassy
		PM	IWRM ToolBox Demonstration & Exercise	Dima Reda, UNEP-IETC
5	Tue	AM	ESTIS Training	Robert Rodriguez, KyUNEP-IETC
		PM	ESTIS Training	UNEP-IETC
6	Wed	AM	IWRM: 1) Concept, Principles, 2) Strategies, Plans, 3) Policy Integration, 4) Organizational Framework	Dr. Nadim Farajalla, AUB
		PM	IWRM: Water Demand & Supply Management (Domestic and Industrial)	Dr. Nadim Farajalla, AUB
7	Thu	AM	IWRM: Economic Aspects	Dr. Ragy Darwish, AUB
		PM	IWRM: Economic Aspects	Dr. Ragy Darwish, AUB
8	Fri	AM -	IWRM –Water Demand and Supply Management (Agriculture)	Dr. Musa Nimah, AUB
		PM	IWRM –Water Demand and Supply Management (Agriculture)	Dr. Musa Nimah, AUB
9	Sat	AM	Environmental Impact Assessment	
		PM	IWRM: Coordination within the Arab Region	Ms. Julie Abuarab, ESCWA

2. Logistics

Accommodation

Venue

Bristol Hotel, Amman, Jordan

Site visit

3. List of Lecturers

Musa Nimah: Professor of Irrigation at the Department of Land and Water Resources, AUB
<nimah@aub.edu.lb>

Ragy Darwish: Associate Professor of Resource Economics at the Department of Land and Water Resources, AUB
<mdarwish@aub.edu.lb>

Nadim Farajalla: Assistant Professor of Environmental Hydrology at the Department of Land and Water Resources, AUB
<nf06@aub.edu.lb>

4. List of Participants

Name	Position	Affiliation
Mr. Abd Abbas K.	Civil Engineer	Ministry of Municipalities and Public Works
Mr. Abd Ibrahim M.	Head of Marsh Dept.	Ministry of Environment - Baghdad
Mr. Abdul-Rahman Kifah R.	Chief Engineer	MoWR/ AL-Rafidain General Company for Dams Const.
Mr. Abdul Ridha Tariq H.	Engineer	Ministry of Water Resources
Ms. Aesa Suha A.	Engineer	Ministry of Municipalities and Public Works
Mr. Ahmad Ahmad S.	Environmental Engineer	Ministry of Environment - Baghdad
Mr. Ahmad Ali R.	Civil Irrigation Engineer	Ministry of Water Resources
Mr. Ahmed Mahmoud A.		Ministry of Water Resources
Mr. Al-Abadei Abbas A. S.	Head of Marshes Council	Marsh Arab Forum - Thi Qar Gov.

Dr. Al-Lami Ali A.-Z. Z.	National Coordinator	Ministry of Environment
Mr. Al-Obedi Belal A. Y.		Ministry of Environment - Thi Qar Gov.
Ms. Al-Zubaidi Inaam M. H.		MOE/Thi-Qar Environment Directorate
Mr. Ali Jamal M.		Ministry of Water Resources
Mr. Ali Kathem Q.	Engineer	Ministry of Water Resources
Mr. Bedn Qassim H.		Ministry of Water Resources
Mr. Faraj Parosh H.	Engineer	MoWR/Directorate General of Irrigation and Dam
Ms. Hasuon Ibtisam A.	Director of Missan Environment	Ministry of Environment - Missan Gov.
Mr. Hussain Khalil I.	Environmental Inspector	Ministry of Environment - Basrah Gov.
Mrs. Ibrahim Jathwa A.A.K.	Engineer	Ministry of Environment - Baghdad
Mr. Ismail Talib H.		Ministry of Water Resources
Ms. Jabar Shaema M.	Engineer	Ministry of Environment - Missan Gov.
Mr. Kadham Ali J.		Ministry of Municipalities and Public Works
Mr. Kbin Amin A.	Biologist	Ministry of Environment – Baghdad
Mr. Mohamed Taha Y.	Gov. Engineer	Ministry of Environment - Basrah Gov.
Mr. Riwaih Haitham O.	Engineer	Ministry of Municipalities and Public Works
Ms. Rustom Bothena H.	Agriculture Engineer	Ministry of Environment - Baghdad
Ms. Talab Amwaj A.	Shift Engineer	Ministry of Water Resources
Mr. Wadi Jwad M.		Marsh Arab Forum - Missan Gov.
Mr. Yousef Yassir A.	Engineer	Ministry of Municipalities and Public Works
Mr. Zayer Jabbar A.	Civil Engineer/ Head of Water Quality Dept.	Ministry of Environment - Baghdad

Appendix II

Structure of Participant's Handbook

1. Overview of the UNEP Project “Support for Environmental Management of the Iraqi Marshlands”
2. Background for the Training Course
3. List of Training Kits “Environmental Management of the Iraqi Marshlands”
4. Table of Contents
5. Lecture Papers and Presentations

Appendix III

Evaluation Questionnaire Template

QUESTIONNAIRE TO BE COMPLETED AT THE END OF THE TRAINING

1. Course objectives, contents and design

1.1 To what extent did the content correspond to the objectives of the course?

	1	2	3	4	5	6	
To a small extent							To a large extent

1.2 To what extent were the objectives of the course were achieved?

	1	2	3	4	5	6	
To a small extent							To a large extent

1.3 What improvements to the content do you suggest?

Topics to add:

Topics to omit:

Topics to deal with more thoroughly:

1.4 How do you judge the level of the course?

Adapted to your level

Adapted to a level below yours

Adapted to a level above yours

1.5 Did the duration chosen seem to you to be

Appropriate

Too short

Too long

1.6 How do you judge the distribution of time between the different subjects?

Unsatisfactory

1	2	3	4	5	6
---	---	---	---	---	---

 Very satisfactory

Between theory and practice?:

Unsatisfactory

1	2	3	4	5	6
---	---	---	---	---	---

 Very satisfactory

1.7 Have you had enough opportunities to exchange your experiences with:

The lecturers yes no

The other participants yes no

1.8 Are you satisfied with the materials distributed?

Not at all

1	2	3	4	5	6
---	---	---	---	---	---

 Very satisfactory

2. Impact of the course

2.1 Looking back, did the course come up to your expectations?

Not at all

1	2	3	4	5	6
---	---	---	---	---	---

 To a large extent

2.2 In what way will it help you to improve your work?

It will help you (tick two boxes corresponding to the two biggest advantages):

To make better decisions

To better understand the range of possible options

To apply methods or techniques

To widen your responsibilities

To improve the capabilities of others

Others

2.3 In which area do you think you will encounter most obstacles in applying the knowledge acquired from the course?

Reluctance on the part of hierarchical superiors

Reluctance on the part of colleagues

Constraints at the procedural and political level

Financial constraints

Others

2.4 To what extent was the content of the course adapted to the needs and practices of your country?

Not at all

1	2	3	4	5	6
---	---	---	---	---	---

 Entirely

3. General organization

3.1 Were you satisfied with:

The welcome?

Not at all

1	2	3	4	5	6
---	---	---	---	---	---

 To a large extent

The accommodation?

Not at all

1	2	3	4	5	6
---	---	---	---	---	---

 To a large extent

The help provided by the organizers of the course?

Not at all

1	2	3	4	5	6
---	---	---	---	---	---

 To a large extent

4. Other comments