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OPTIMA

Optimisation for Sustainable Water Resources Management

Instrument type: Specific targeted research or innovation project

Priority name: SP1-10

D16.3 Regional Dissemination Workshop

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Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

D16.3 Regional Dissemination Workshop

The Regional Dissemination Workshop was organized and hosted by IRMCo as lead contractor for the dissemination activities within OPTIMA.

The workshop took place in Qawra, Malta over 2 days, i.e. during 28-29 May 2007. In addition to presentations by each of the OPTIMA research teams, the programme also featured presentations by four invited speakers.

Three round-table sessions were organized in order to stimulate an active dialogue between the researchers and some of the major stakeholders in the OPTIMA case studies.

All presentations of the Malta Regional Workshop can be downloaded from www.environmentalmalta.com/downloads

This document contains:

- Programme of the Workshop
- Purpose of the Workshop
- Lead Questions for the Roundtable Sessions
- Conclusions of the Roundtable Discussions
- Abstracts of the Case Studies (circulated with the Second Announcement)
- List of the workshop participants

IRMCo (WP16 Leader)

30 June 2007

Regional Workshop on Optimisation for Sustainable Water Resources Management



Malta, 28 – 29 May 2007

Event organized by



Event supported by



Regional Workshop Programme – Day 1

28 May 2007

09.00 – 09.30 Registration

09.30 – 10.30 Welcome Address

Joanna Drake, Head of the EC Representation in Malta

Purpose and Objectives of the Workshop

Anna Spiteri, IRMCo, Malta

Presentations by Invited Speakers

- What's at Stake: Managing Stakeholders or Stakeholding Managers?
Håkan Tropp, Project Director, UNDP Water Governance Facility, SIWI, Sweden
- What is gender, and why is it important in water management
Christine van Schoot, GWA, The Netherlands

10.30 – 11.00 Coffee break

11.00 – 12.30 Demonstration of OPTIMA DSS,

Kurt Fedra ESS, Austria

12.30 – 14.00 Lunch

14.00 – 15.30 OPTIMA Presentations: First Session

From Problem Statement to Baseline Scenario

- Replies to Water Issues Questionnaire
Ugo Gasparino, FEEM, Italy
- Dhiarizos River Basin Case Study
Charalambos Panayiotou, ATLANTIS, Cyprus
- Martil River Basin Case Study
Karim Benhachmi, UH2M, Morocco
- Melian River Basin Case Study
Myriam Haffani, CNTD, Tunisia
- Litani River Basin Case Study
Mohamed Khawlie, NCRS/ELARD, Lebanon
- Analysis of stakeholder preferences
Marco Parolin, CZERO, Italy

15.30 – 16.00 Coffee Break

16.00 – 17.30 Roundtable Discussion

Facilitators: Håkan Tropp, Anna Spiteri

Regional Workshop Programme – Day 2

29 May 2007

09.00 – 10.30 Presentations by Invited Speakers

- UNDP/GEF Danube Regional Project - trans-boundary co-operation, nutrient reduction and WFD implementation
Peter Whalley, DRP, Austria
- Optimisation of technical, socio-economic and environmental efficiency in irrigation management: the role of new technologies
Anna Osann, UCLM, Spain
- How to mainstream gender in water management
Christine van Schoot, GWA, The Netherlands

10.30 – 11.00 Coffee break

11.00 – 12.30 Roundtable Discussion

Facilitators: Anna Osann Jochum, Peter Whalley

12.30 – 14.00 Lunch

14.00 – 15.30 OPTIMA Presentations: Second Session

From Alternative Scenarios to Optimal Decisions

- Water Technologies
Apostolis Karteris, INTERGEO, Greece
- Gediz River Basin Case Study
Nilgun Harmancioglu, SUMER, Turkey
- Zarqa River Basin Case Study
Muhamad Shatanawi, UoJ, Jordan
- Zeimar/Alexander River Basin Case Study
Nir Becker, IPCRI
- Comparative Analysis
Ricardo Houry, ELARD, Lebanon
- Future Dissemination Strategy
Dirk De Ketelaere, IRMCo, Malta

15.30 – 16.00 Coffee Break

16.00 – 17.30 Roundtable Discussion

Facilitators: Muhammad Shatanawi, Christine van Schoot

17.30 – 18.30 Outcome of Roundtable Discussions and Conclusions

Dirk De Ketelaere, overall rapporteur of the workshop



Workshop Venue

The Workshop will be held at the Suncrest Hotel, Qawra, Malta.

Post-Workshop Excursion

The excursion will take place on May 31, 2007, from 9.00 a.m. to 7.00 p.m and will include a visit to the megalithic temple of Mnadjra and the Maghlaq fault, followed by a visit to Valletta.

Scientific and Local organizers

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The Regional Workshop is supported by:

European Commission, Sixth Framework Programme, FP6
SIWI, UNDP Water Governance Facility, Sweden
Gender Water Alliance, GWA, The Netherlands
DRP, UNDP Global Environment Facility, Austria
Universidad de Castilla La Mancha, UCLM, Spain

Purpose and objectives of the Workshop

Anna Spiteri, IRMCo, Malta

What is the *purpose* of the workshop ?

To bring together the scientific researchers of the Optima project with some of the leading stakeholders across the 7 regional case studies

with the following general objective:

To assess the effectiveness of the mechanisms employed for stakeholder involvement throughout the Optima project; and to make new suggestions where relevant

and with the specific objectives:

To *identify* common solutions to the water issues in the region

And to *consider* the present choice of alternative scenarios

And *how* would the alternative scenarios look if we include a gender perspective in the equation?

- To reach these objectives we have 3 roundtable discussions in the programme with ample time for discussion.
- Our task is to record the insights, viewpoints raised by the stakeholders which will provide valuable input also for future dissemination activities

The Expected Result of the workshop is:

A *comparative evaluation* of the individual case study findings based on an active south-south dialogue

At the end of the workshop we will revisit these objectives and reflect if they have been reached

Workshop Sessions

Framework for common steps in each of the OPTIMA Case Studies


Steps	Expected output	Stakeholder involvement	Interface with DSS development
1. State of the water resources	Problem statement	Workshop Session 1: From Problem Statement to Baseline Scenario	
2. Diagnosis of the water resources	Baseline scenario		
3. Alternative scenario formulation	Alternative scenarios	Workshop Session 2: From Alternative Scenarios to Optimal Decisions	
4. Consensus on optimum decisions	Optimal decisions		

Step 1 State of the Water Resources

At an early stage in the OPTIMA project, stakeholders in each of the 7 case studies were invited to assist *in the identification of the main problems* and issues on the basis of a comprehensive ‘**Issues Questionnaire**’.

The aim of this process involved the formulation of a clearly defined ‘**problem statement**’ that takes into consideration the *priority ranking of the issues as assigned by the stakeholders*.

Water Issues Questionnaire used in 7 Case Studies

Issues										
	undef.	don't know	very unimportant	increasing levels of importance			very important			
Physical Conditions										
Water Mgmt										
Water Demand										
Water Supply										

Step 2 Diagnosis of the Water Resources

The second step targets the creation of a *baseline scenario* for each of the 7 case studies in OPTIMA, which *describes the behaviour and performance* of the respective water resources system adequately and is representative of all the elements that are deemed important by the stakeholders.

The crucial point here is to verify whether the observed (and projected) **performance of the system does indeed reflect the problems as perceived by the stakeholders**: the basic simulation model structure and its components should reflect the problem statement, and thus all the elements that are deemed important by the stakeholders.

Step 3 Alternative Scenario Formulation

The objective here is to compare the baseline scenario with **alternative scenarios** using the same set of criteria that are used by the simulation model to judge the performance of the water resources system *under different sets of possible, future conditions* in each of the 7 Case Studies in OPTIMA.

Stakeholders *may expect an improved or higher performance* of the water resources system e.g. in terms of the reliability of supply, the volume and/or quality of water available at a particular demand node etc.

In order *to achieve the higher level of performance as desired by the stakeholders*, any number and combination of ‘control options’ can be introduced into the model. Possible measures to affect the performance criteria may include **alternative water technologies, pollution control, pricing, education etc.**

Lead Questions for the Roundtable Sessions

Introductory presentation to the Roundtable Sessions by Anna Spiteri, IRMCo

At the kick-off meeting of the OPTIMA project in November 2004, IRMCo issued the following Dissemination Strategy:

Dissemination Strategy: Scope of dissemination initiatives and Expected Results

- Bring the OPTIMA research to the attention of actors in each of the case study areas ... communicate progress to them on a regular basis ... using different ‘formats’.
 - positive outcome: attract – and maintain - interest of stakeholders (even if no specific feedback is obtained)
 - very positive outcome: stakeholders provide feedback, respond to questionnaire(s)
 - excellent outcome: stakeholders actively contribute to research on their case study

- Highlight that the same research is carried out across the region (seven different case studies) ... draw the attention of stakeholders to comparable or similar issues ... how this is being tackled in OPTIMA ... focus on practical problem solving & conflict resolution
 - positive outcome: increased awareness of OPTIMA research effort across the Mediterranean region
 - very positive outcome: stakeholder networks are formed in each of the case study areas
 - excellent outcome: active south-south dialogue between stakeholders



Lead-Questions for Roundtable Sessions during the Workshop

The intention is to assess the outcome of the dissemination strategy on the occasion of the Regional Workshop, using a series of lead-questions for each of the Roundtable Sessions.

For the questions which specifically invite to distinguish between the viewpoint of the research teams and of the stakeholders, it will be attempted to find the point of 'synergy'.

Also, the feedback from the Stakeholders during this Workshop will be used to guide the research teams to formulate their **future dissemination and exploitation plans** beyond the life-time of the project.

Roundtable 1
From Problem Statement to Baseline Scenario
Lead Questions

Facilitators: Håkan Tropp, Peter Whalley

Specific activities to engage with Stakeholders that were used in OPTIMA included mailshots, a dedicated website, a Water Issues Questionnaire (used in each of the case studies), posters, individual meetings with stakeholders and stakeholder workshops.

Q1. Do you consider these activities were effective to attract the **interest** of the stakeholders to the research? What is the viewpoint of the research teams ? What is the viewpoint of the stakeholders? (! public bodies, private entities, NGOs may hold different viewpoints on this !)

Q2. Do you consider these activities were effective to attract the **feedback** of the stakeholders in the formulation of the Problem Statement and the design of the Baseline Scenario? What is the viewpoint of the research teams? What is the viewpoint of the stakeholders?

Q3. Do the research teams consider that these activities had an impact on getting the stakeholders **involved** in the actual research (e.g. through the supply of data required by the DSS)?

Q4. Do the stakeholders consider that there could have been other / more effective ways for them to become **involved** in the actual research?

Roundtable 2

Legislative and socio-economic aspects, and the gender perspective

Lead Questions

Facilitators Anna Osann Jochum, Anna Spiteri

Using the European Water Framework Directive as the reference framework from a legislative point of view, the river basin approach used in the OPTIMA case studies, also considered economic efficiency, environmental compatibility, and social equity as the pillars of sustainable development.

Q1. Do you consider that the WFD could assist in practical problems solving and conflict resolution? What is the viewpoint of the research teams? What is the viewpoint of the stakeholders?

Q2. Do you consider that OPTIMA led to new insights on socio-economic and environmental aspects that are an integral part of the IWRM approach as promoted by EUWI?

Q3. Following the presentations on gender at this Workshop, how would you encompass a more effective gender mainstreaming approach in water management?

Roundtable 3

From Alternative Scenarios to Optimal Decisions

Lead Questions

Facilitators Muhammad Shatanawi, Christje van Schoot

The Dissemination Strategy in OPTIMA was designed with the respective objectives to (a) increase awareness on similar or comparable issues across the Region, (b) encourage stakeholder networks to be established in each case study, and (c) assist an active south-south dialogue among stakeholders

Q1. Did the dissemination activities lead to an **increased awareness** on the water management issues affecting the Region? What is the viewpoint of the research teams? What is the viewpoint of the stakeholders?

Q2. Did the dissemination activities enable to establish a more constructive **dialogue** among the stakeholders in the respective case studies? What is the viewpoint of the research teams ? What is the viewpoint of the stakeholders?

Q3. Do you consider that OPTIMA has been effective in bringing to the fore comparable or similar water issues across the region? Which ones?

Q4. Which future dissemination activities would you suggest to further encourage a south-south dialogue?

**Conclusions of
Malta Regional Workshop
28-29 May 2007**

**Rapporteur for Roundtable Discussions
Dirk De Ketelaere, IRMCo, Malta**

Point of departure for the first roundtable:

Participatory stakeholder involvement is formally stated as an objective in the OPTIMA research contract (INCO-CT-2004-509091, 1 July 2004 – 30 June 2007)

Specific activities to engage with Stakeholders included mailshots, a dedicated website, a Water Issues Questionnaire (used in each of the case studies), posters, individual meetings with stakeholders and stakeholder workshops

Outcome of discussions:

- Engaging the stakeholders proved more difficult to implement than expected
- The process has been a learning curve for all the research teams in OPTIMA
- It is never too early to involve stakeholders in a research project
- Stakeholders tend to stick to their individual ‘wishes’, and researchers have the challenge to provide an objective opinion and to keep a general overview
- The Water Issues Questionnaire that was employed proved a very robust method, provided additional explanation was given in the national language, and provided the replies were collected in face-to-face meetings
- Stakeholder replies to the questionnaire need to be verified and validated, and the results communicated back to them
- The Baseline Scenario for the case studies could be more effectively prepared by a ‘smaller’ group of stakeholders, and the group is chosen ‘democratically’, for example through a kind of ‘election’ in a stakeholder workshop

Point of departure for the second roundtable:

The presentations of the invited speakers directed the discussions of the second roundtable on the implementation of the Water Framework Directive, the role of new technologies, and how to mainstream gender in water management

Outcome of discussions:

- The Water Framework Directive was equated with the adoption of a river basin approach in each of the case studies
- The spatial and temporal data requirements of the model proved difficult to satisfy even for those basins that have been studied extensively
- Gaining access to these data, which are mostly held by public authorities presented another problem:
 - o If you are famous in your river basin, life is a lot easier
 - o If you are not famous in your river basin, be “smart”
- Access to the data improved considerably when representatives of these stakeholders were either formally or informally integrated within the respective research teams, for example through the setting up of a steering committee
- Even if no conflicting demands are observed, participatory involvement is a good way to avoid such conflict in future
- Gender mainstreaming: the issue is whether the views of 50% of the population have been considered
- There are very few role-models of woman water managers, be it in the MENA countries, developing countries, or indeed in Europe

Point of departure for the third roundtable:

The Dissemination Strategy in OPTIMA was designed with the respective objectives to (a) increase awareness on similar or comparable issues across the Region, (b) encourage stakeholder networks to be established in each case study, and (c) assist an active south-south dialogue among stakeholders.

The third roundtable invited the stakeholders present to suggest how a future dissemination strategy could further improve on the results that were achieved

Outcome of discussions:

- The future dissemination activities of the research teams are already well defined in relation to the scientific community through the submission of articles to scientific journals and presentations of papers at conferences
- With respect to future dissemination to the stakeholders, the following conclusions were reached:
 - o The research teams carry an obligation towards the stakeholders to show them the results that were obtained in order to acknowledge their active involvement and contributions to the research that was carried out
 - o The results of the comparative analysis between the respective case studies should feature strongly in future dissemination activities
 - o While the focus should be on the success stories that were achieved, future dissemination should maintain an appropriate link to the further research needs that were identified



Dhiarizos River Basin

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Abstract

The Dhiarizos catchment area is situated in the southwestern coastal area of Cyprus. Though covering an area of only 260 km² it is considered one of the main watersheds of Cyprus. The catchment includes 25 rural communities totaling a population of 3550 people. A section of the catchment is a designated Natura 2000 site. Within the watershed there are seven subcatchments providing an inflow of approximately 30 Mm³ per year. A dam at Arminou located at the upper end of the river course, with a holding capacity of 4.5 Mm³, is used mainly to divert water to the Kourris dam. Controlled flow is also provided downstream. Together with several other diversions along the main path of the Dhiarizos river, between 10 and 15 Mm³ per year are transferred to users outside the basin. Additional outflows include several irrigation and drinking water wells. Water used for irrigating citrus and deciduous trees consumes a significant amount of the water utilized within the catchment area.

A baseline scenario of the case study was initially designed based on the river catchment's physical characteristics and the views of stakeholders consulted during the scenario design. Stakeholders represent government ministries and agencies, local community officials and local community members. The key issues that were identified from the stakeholder interviews include problems associated with periodic water scarcity and conflicting water demands from within and outside the catchment area. Results from the initial scenario runs indicated no problems in the overall water supply demand ratio. However a relatively low benefit/cost ratio was shown. Several optimization options were subsequently selected that aimed to provide improved cost/benefit ratio and reliability of water use alternatives. A key constraint in the optimization process was the fulfillment of water demands by users within the catchment area as this was identified as an issue from stakeholder interviews.

The stakeholder involvement efforts and the results from the baseline scenario and optimization modules have been useful in identifying key water management issues and opportunities for improving the overall use benefit of water. Some concerns remain however regarding the accuracy of the basin characterization in the model, which merit further examination. These concerns are raised from an apparent overestimation of water outflow to sea. Two issues that need to be further examined are the amount of unauthorized water extraction from wells and the water losses due to two small sized faults that cross the main path of the river.



Martil River Basin

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Abstract

The Martil river basin extends over 1170 km² along the Mediterranean coast of Morocco and hosts a population of 450000. The total length of its main water courses exceeds 270 km. The average pluviometry over the period 1980-2006 is 647.9 mm per year and results in an average annual water input to the basin of around 424 Mm³. The existing water resources are under pressure from rapid population growth, tourism, industrial development and pollution. To maintain the sustainable development of the region and to assess the long-term impact of water policies, all types of demand (domestic, tourism, industrial and irrigation) should be evaluated in terms of existing trends and possible future scenarios in the water used by the different sectors while also taking into account flood protection and environmental issues.

The management of the water resources in the basin is complicated as it depends on many actors. The replies from stakeholders to the OPTIMA water issues questionnaire provided a valuable starting point during the discussions which were organized in the context of “national water debate” meetings. The ABHL (Agency of the Hydraulic Basin of Loukkos), one of the main stakeholders in the region participated actively in this process and assisted in reaching consensus on the priority ranking of the issues affecting the basin among the representatives from a wide range of public organizations, research entities, NGOs and the private sector. The ABHL also actively contributed to the formulation of alternative scenarios at the level of the entire basin. Specific measures to achieve this objective consider the construction of a new reservoir to meet the water demand in the region in the coming 20 years. The proposed infrastructure also targets a significant reduction in the risk of floods compared to the present situation. The research team consults regularly with the major stakeholders in the basin to assist UH2M in the further refinement and critical analysis of these future scenarios.



Melian River Basin

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Abstract

The Melian river basin extends over 553 km² and has a population of 390500. Rainfall is very low with an average of 450 mm per year. Groundwater over-exploitation reaches 150% of the net annual recharge and has resulted in salinity levels in excess of 20g/l in some area of the basin. The potable water supply in the Melian basin is strongly dependent on the importation of water from outside the basin. The Medjerda canal conveys 14 million m³ from the north of Tunisia to Cap Bon. Untreated wastewater from outside the basin is discharged into the Melian, exacerbating the problem of pollution in the Gulf of Tunis. The management of the water resources in the basin is complicated because it depends on many actors.

The replies from stakeholders to the OPTIMA water issues questionnaire provided a most valuable starting point during a workshop organized in May 2006. Round-table discussions assisted in reaching consensus on the priority ranking of the issues affecting the basin among the representatives from a wide range of public organizations, research entities, NGOs and the private sector. Significant improvements were made to the topological model, resulting in a baseline scenario which reflects more closely the current performance of the basin. Last but not least, the workshop invited the participants to express their views on the future, desired performance of the basin. This led to the formulation of alternative scenarios at the level of the entire basin and focuses on a reduced dependency of the basin on the importation of water. Specific measures to achieve this objective consider the artificial recharge of groundwater with surface water that is collected in existing hillside lakes and Medjerda canal as well as the construction of a new water treatment plant. Another important outcome of the workshop concerned the setting up of steering committee, composed of the major stakeholders in the basin, who have been meeting regularly to assist the research team at CNT in the further refinement and critical analysis of these scenarios.



Lower Litani River Basin

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Abstract

Located in coastal southern Lebanon, downstream of the inland Qaraoun Lake, the Lower Litani basin covers a total surface area of 616 km². It consists of one main river segment and eight secondary branches. The Litani is the longest and largest river in Lebanon with a length of 170 km and an estimated average discharge rate of 8 to 9 m³/s.

Stakeholders have been actively involved from the early stages of the research through the use of a water issues questionnaire. About 40 representatives of public institutions, local authorities, private entities and NGOs participated in a consultation workshop in September 2005 to discuss the water problems and to reflect on the future development of the basin. Some stakeholders hold the view that the southern part of the Litani River is not deemed to be significantly polluted compared to its inland reaches. However, the unabated disposal of solid waste and raw wastewater in the river is anticipated to lead to severe water quality problems in the future. A major issue resides in the lack of enforcement in the basin, which leads to numerous violations. The very high water consumption for irrigation purposes leads to severe water allocation problems, to the extent that the domestic demand cannot be met in some villages, while during the winter period large volumes of water are lost to the sea.

Major economic growth potential can be found both in the agricultural and tourism sector. By taking advantage of the basin's advantageous topography, dams and hydroelectric stations would enable the more efficient use of water. Clearly, water treatment plants would be required to control and mitigate the adverse effects of increased pollution levels such growth would bring about. The Litani River Authority, being the main institution responsible for the management of infrastructure along the river, is being closely involved in the optimization of such future scenarios which were defined jointly with the stakeholders.



Gediz River Basin

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Abstract

The Gediz River Basin along the Aegean coast of Turkey is a typical case where two major problems, water scarcity and pollution, need to be addressed for sustainable management of its water resources. The basin covers about 18,000 km² and approaches a total population of 2 million. Although the basin experiences droughts from time to time, water shortage in Gediz is due basically to competition for water among various uses (water allocation problems) mainly irrigation with a total command area of 110,000 ha versus the domestic and fast growing industrial demand in the coastal zone, and environmental pollution. The case study demonstrates the entire range of prototypical water management problems in the region, and their potential solutions. The existing water resources are under pressure by rapid industrial development, population growth, related increases in agricultural production, and pollution. To provide water for different sectors, to maintain the sustainable development of the region and to assess the long-term impacts of water policies, domestic, industrial, irrigational, and environmental water demands should be evaluated in terms of existing trends and possible future tendencies in water use. The case study also reflects the importance of the institutional and regulatory framework, and the need for direct participation of major actors and stakeholders in the planning and decision making processes. A common shared and reliable information basis is a central element of the participatory approach. To this end, in April 2006, SUMER organized a 2-day stakeholder workshop in Izmir to set the basis for the optimization procedure in OPTIMA for the Gediz case study. The results of the workshop indicated the presence of two major problems within the basin: water pollution and overexploitation of water resources (i.e. water over-use). Regarding water scarcity, the following issues were considered significant and agreed upon by the stakeholders: (a) significant water losses in water conveyance systems of both the irrigation systems and the domestic water supply systems, which lead to increased water demand; (b) lack of public and water user awareness on overexploitation of water and water scarcity; (c) inefficient and out-of-date irrigation systems and technologies, which lead to increased irrigation water demands; (d) lack of sufficient and reliable information on the amounts of water actually used by different sectors. The stakeholders have further stressed that, for proper water demand management, the following needs should be focused on: (a) reduction of water losses in water conveyance systems (both irrigation and domestic water supply systems); (b) education and awareness on irrigation and domestic water use; (c) the use of new irrigation technologies; and (d) monitoring of water demand. The above priority listing of water problems in Gediz was considered as input to the formulation of management scenarios in OPTIMA. The case study has basically focused on water demand management to analyze the problem of water shortage. Scenarios involved alternative solutions for reduction of water losses in water conveyance systems (both irrigation and domestic water supply systems) and for the application of new irrigation technologies.



Zarqa River Basin

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Abstract

The Zarqa River is the second largest river in Jordan after Yarmouk River. The river basin drains an area of 4120 km² of which about 95% is within Jordan and only 5% is in Syria. The basin extends from the Syrian city of Salkhad in Jebal al-Arab with an elevation of 1460 m to south of Amman and then westward to discharges its water at its confluence with River Jordan at an elevation of -350 m. The annual rainfall ranges from more than 500 mm in the north western part to less than 100 mm in the eastern part with an average precipitation of 280 mm/year. The stream flow of the Zarqa River is impounded by King Talal Dam at an elevation of 120 m and a capacity of 75 MCM. The area behind the dam is about 3100 km² producing an average runoff of about 60 MCM. The water resources system considers runoff water, groundwater, treated effluent and inter-basin transfer. The volume of treated effluent reached 70 MCM in 2005 while abstracted groundwater is estimated at 130 MCM compared to a safe yield of 80 MCM. About 2.88 million people (2005) are living in the basin representing about 50% of the total population in Jordan. Water for domestic use is supplied from groundwater within the basin, surface water transfer from the Jordan valley and other inter-basin transfer. The basin also hosts 80% of Jordan's industries, including al-Hussein thermal power plant, oil refinery, intermediate petrochemicals, as well as engineering, textile, leather and phosphate mining industries.

The main problems affecting the Zarqa River Basin are the scarcity of water which is a result of the wide fluctuations in annual rainfall, population growth, and water quality deterioration due to the large number of solid wastes disposal sites located within the basin. Stakeholders have been involved from the beginning of the OPTIMA project by identifying the water issues. They have been involved also in building up the baseline scenario by making improvements to the topological model and suggesting future, alternative scenarios. The latter consider the future projection for water demand as a result of population growth, new industries and increased services. Additional water resources have been identified including inter-basin transfer and water desalination; and new measures have been taken in demand management like rehabilitation of networks, public awareness programmes and water conservation measures. A steering committee, composed of major stakeholder in the basin, has met twice during the process of optimization for their further advice and suggestions.



Wadi Zeimar/Alexander River Basin

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Abstract

As a result of population growth, most of the water flowing in the region's rivers and streams was captured and diverted to meet the growing needs for water supply. Thus, most rivers turned into dry river-beds which deliver only sporadic floods during winter. Simultaneously, the same accelerating population growth resulted in uncontrolled discharge of raw sewage into the rivers, transforming many of them into open sewage channels. In recent years, various governmental and non-governmental organizations invest increasing efforts to improve the poor condition of the rivers and streams. However, questions arise as to how water should be allocated to the streams, what quality should be achieved, what the water should be used for and what are the economic implications of all the above. The situation is even more complicated since many of the regions' streams are actually trans-boundary streams.

The Zeimar-Alexander river starts within the Palestinian authority, flows west into Israeli territory and eventually reaches the Mediterranean Sea. Each entity has its own vision about the water quality which is not necessarily accepted by all stakeholders. Clearly, to achieve optimum management of the river basin, the vision of both entities needs to be taken into consideration. This was made the object of two workshops held during December 2006, in which stakeholders and endusers were invited to provide their respective viewpoints on the future, desired performance of the river basin. While circumstances did not permit to organize a joint Israeli/Palestinian workshop, the participants in both workshops were asked to consider how an integrated management of the river could lead to benefit sharing among both communities.

The consensus which emerged from both workshops indicated that any future alternative scenarios should focus on the basin as a whole, and reinforced the need to consider alternative options for the treatment of pollution sources, for the allocation of different quantities of water to the stream, as well as for the various uses of the water (agricultural, recreational, environmental, urban, etc.). The assessment of these alternative scenarios may serve as a pioneering example as to the simultaneous use of economic, engineering as well as ecological tools in order to achieve an optimum management of the river basin.



List of Workshop Participants

Invited Speakers	ACR	Organisation	Country
Håkan Tropp	SIWI	UNDP Water Governance Facility, SIWI	Sweden
Peter Whalley	DRP	UNDP Global Environment Facility, DRP	Austria
Anna Osann Jochum	UCLM	Universidad de Castilla La Mancha	Spain
Christine van Schoot	GWA	Gender Water Alliance	The Netherlands
Stakeholders	ACR	Organisation	Country
Spyros Stefanou	WDD	Water Development Department	Cyprus
Mohamed Lotfi Nacef	CRDA	Commissariat Regional au Developpement Agricole	Tunisia
Khalid Nadifi		Wamanconsulting	Morocco
Huseyin Gundogdu	DSI	DSI-State Hydraulic Works	Turkey
Rafik Kattan	NGO	NGO, Litani	Lebanon
Ghada Mekheil al-Naber	NCARTT	National Center for Agricultural Research and Technology Transfer	Jordan
OPTIMA Partners	ACR	Organisation	Country
Charalambos Panayiotou	ATLANTIS	ATLANTIS	Cyprus
Myriam Haffani	CNT	Centre National de Teledetection	Tunisia
Béchir Nefzawy	CNT	Centre National de Teledetection	Tunisia
Karim Benhachmi	UH2M	Université Hassan II- Mohammadia	Morocco
Mohammed Moukhchane	UH2M	Université Hassan II- Mohammadia	Morocco
Nilgun Harmancioglu	SUMER	SUMER, Dokuz Eylul University	Turkey
Cem P Cetinkaya	SUMER	SUMER, Dokuz Eylul University	Turkey
Nir Becker	IPCRI	Israel/Palestine Centre for Research and Information	Israel
Eran Friedler	IPCRI	Israel/Palestine Centre for Research and Information	Israel
Mohamed Khawlie	NCRS	National Center for Remote Sensing	Lebanon
Ricardo Houry	ELARD	Earth Link & Advanced Resources Development	Lebanon
Muhamad Shatanawi	UoJ	Faculty of Agriculture, University of Jordan	Jordan
Kurt Fedra	ESS	Environmental Software & Services GmbH	Austria
Ugo Gasparino	FEEM	Fondazione Eni Enrico Mattei	Italy
Barabara Del Corpo	FEEM	Fondazione Eni Enrico Mattei	Italy
Marco Parolin	Czero	corridoio.zero	Italy
Giulana Gemini	Czero	corridoio.zero	Italy
Apostolis Karteris	INTERGEO	INTERGEO HELLAS Environmental Technology	Greece
Anna Spiteri	IRMCo	Integrated Resources Management Company Ltd.	Malta
Dirk De Ketelaere	IRMCo	Integrated Resources Management Company Ltd.	Malta
Josianne Vella	IRMCo	Integrated Resources Management Company Ltd.	Malta