

Interim UNESCO Chairs Programme Progress report

Period of activity: 01/01/2004-31/12/2005

Title of the UNESCO Chair or Network:

UNESCO/EOLSS Chair in Wadi Hyrdology

Report established by: *Prof. Muhammad. R. Shatanawi*

Function / Title: *Chair holder*
Professor of Water Resources
University of Jordan

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I. Address

	Address of the Host Institution	Address of the Chair holder (or coordinator)
Name: Function/Title: University/Institution: Faculty/Department/Centre: P.O.Box: Street: Postal Code: City : Province: Country: Phone : Fax: E-mail: Web Site :	<p style="text-align: center;">University of Jordan</p> <p style="text-align: center;">Amman</p> <p style="text-align: center;">Jordan</p>	<p style="text-align: center;"><i>Prof Muhammad Shatanawi</i> <i>UNESCO Chair Holder</i> <i>Jordan University</i> <i>Faculty of Agriculture</i> <i>13042</i> <i>Queen Rania street</i> <i>11942</i> <i>Amman</i> <i>Amman</i> <i>Jordan</i> <i>962 777 48 44 99 ,</i> <i>962-6-5355000/2580</i> <i>962-6-5355577</i> <i>shatanaw@ju.edu.jo</i> <i>www.ju.edu.jo,</i> <i>http://web.ju.edu.jo/wadihydrology</i></p>

II. Available resources

Please specify for each item, when available, **total cost** and **funding sources**
(for guidelines see Annex 3)

A. Human resources

1. For the administration of the UNESCO Chair

- Prof. M. R. Shatanawi, Chair holder of the Wadi Hydrology
- Ms. Sawsan Naber, Chair administrative and information officer

2. For the teaching/training/ research activities:

- One Ph.D in hydrology, Two Ph.D. in GIS and remote sensing working on different projects of the Chair.
- Five research assistants working on GIS.

B. Material resources

- Computers, printers, and scanners.
- GIS facilities and software.
- Automatic Weather Station.
- Field Equipment.

III. Activities

A. Research

1. Characterization of Wadi Systems in Jordan.

- a. In order to characterize the Wadi system in Jordan, the different 15 surface basins have been identified with respect to area, volume of runoff, and drainage outlets. These basins can be classified under two categories; basin that drain their water westward ending in the Dead Sea and basin that drain its water into desert Mudflat (Qa'a). Most of the water courses in these wadis are dry creeks. Attached (Annex I) a description of the Basins classified according to their drainage outlet.
- b. Zerqa River basin is under investigation with respect to optimization of water resources under the activities of OPTIMA project which is funded by the European Commission under contract No.: 509091. The following outcomes have been achieved:
 - The boundary of the basin has been delineated
 - The basin has been subdivided into the following sub-basin: Sail Amman, Wadi Dhuliel, Jerash, Wadi Rmaimein, Wadi el-Kittih and other small wadies. Wadi Dhuliel sub-basin representing the arid land conditions will be studied in details by dividing it into third level catchments. Catchments at these level have been characterized using WMS models.
 - Land use maps have been prepared
 - Data concerning rainfall from 4 stations have been collected as well as runoff reading from Jarash gauging station.
 - Surface water resources, groundwater wells and wastewater treatment plants have been identified and put into GIS format.

- Major population centers have been located and put as a layer in GIS format.
- A progress report on characterization of Zarqa River basin has been prepared (Annex II).

2. Sustainable Management of Scarc Resources in Coasted Areas (SMART).

Expected results:

- Policy guidelines for the management of water resources in Aqaba.
- Develop models to optimize the use of water resources.
- Develop a set of social and technical indicators
- Utilize hydrodynamic models to predict the effect of wind, tides and point source pollution on sea water movement.

Target group:

- Public administration and decision makers.
- Researchers.
- Funding agencies.
- Aqaba Special Economic Zone Authority.

Partnership:

- University of Jordan, Amman, Jordan
- Marine Science Station, Aqaba, Jordan
- Aqaba Special Economic Zone Authority
- Institutions from Portugal, France, Austria, Turkey, Egypt, Lebanon, Jordan and Tunisia

Geographic Coverage: The Coastal area of the Mediterranean.

Funding Sources:

The European Commission

Output:

- Final report (See Annex III).
- Website for the project
- Dissemination plan in conferences and papers

3. Improved Management Tools for Water-Limited Irrigation (IRRIMED)

Expected results:

- Integrated information system for irrigated agriculture in the Jordan Valley.
- Establish a set of data in reference evapotranspiration over selected crop.
- Derive maps of ETR from high resolution satellite images using simple and robust software to estimate ETR.

Target group:

- Irrigation engineers
- Farmers
- Researchers
- Decision makers

Partnership:

- University of Jordan, Amman, Jordan
- National Center for Agriculture Research and Technology Transfer (NCARTT)
- The Ministry of Water and Irrigation, Amman, Jordan
- Institutions from: France, Netherlands, Morocco, Tunisia, Lebanon and Syria.

Geographic Coverage: Jordan Valley.

Funding Sources:

The European Commission

Output:

- Progress Reports (Annex IV).
- Final report
- Website for the project
- Brochure
- Software development

4. Optimization of Sustainable Water Resources Management (OPTIMA).

Expected results:

- Developing the objectives, criteria and constraints in close cooperation with stakeholders and actors in an interactive approach, with emphasis to socio-economic structures and gender where feasible and scientifically meaningful;
- Using a full-featured dynamic and distributed simulation model and genetic programming as the core to generate feasible and non-dominated alternatives. Water technology alternatives including their cost structure, and up-to-date remote-sensing derived land use information are primary inputs;
- Extending the set of objectives, criteria and constraints through expert systems technology to include, difficult to quantify, environmental and social dimensions;
- Putting specific emphasis on local acceptance and implementation through the inclusion of stake-holders in an interactive, participatory decision making process carefully embedded in institutional structures, using a discrete multi-criteria reference point methodology. The formal approach provides a rational basis for policy and decision making, empowerment and legitimacy through information;
- Comparative evaluation and benchmarking across the set of local and regional case studies in 7 countries, namely Cyprus, Turkey, Lebanon, Jordan, Palestine, Tunisia, and Morocco around the Southern and Eastern Mediterranean.

Target group:

- Public administration and decision makers.
- Ministry of Water and irrigation.
- Researchers.

Partnership:

- University of Jordan, Amman, Jordan
- Institutions from Austria, Turkey, Italy, Greece, Cyprus, Palestine, Lebanon, Morocco, Tunisia and Jordan.

Geographic Coverage:

Selected river basins in the Mediterranean region.

Funding Sources:

The European Commission

Output:

- Identification of problem issues (Summary Report)
- Guidelines for the socio-economic analysis: issues and indicators
- Land use data report
- Zarqa River: Problem analysis
- Zarqa River: Optimisation results
- Progress Reports
- Final report
- Website for the project
- Dissemination plan in conferences and papers
-

5. Deficit Irrigation in Mediterranean Agriculture (DIMAS).

Expected results:

- Development of a simulation model for DI design and for yield prediction in water-limited situations.
- Validation of the simulation model using experiments with the various crops and in participants countries.
- Generation of DI recommendations for farmers and water managers that will reduce water use for irrigation in participants countries.
- Characterization of current DI situations in participants countries and document farmers' performance and the limitations of existing irrigation networks.
- Assess the economic viability of DI for the various crops, environments, and water delivery methods in participants countries. For this, the DI simulation model will be coupled with an optimisation module for economic analysis.
- Evaluate the social acceptability of DI and the institutional and cultural features that are needed for the dissemination and acceptance of DI.
- Integrate DI strategies into the management of irrigation water at the watershed, irrigation district, and farm levels.

Target group:

- Farmers.
- Irrigation engineers.
- Decision makers at the Ministry of Water and Irrigation.
- Ministry of Agriculture officials.

Partnership:

- University of Jordan, Amman, Jordan.
- Jordan Valley Farmers Association.
- National Research Center for Agricultural Research and Technology Transfer.
- Institutions from Spain, Italy, Greece, Turkey, Morocco, Tunisia and Jordan.

Geographic Coverage:

Irrigated areas in the Mediterranean regions.

Funding Sources:

The European Commission

Output:

- Progress Reports and Final report
- Website for the project
- Models of DI.

6. Water Saving in Mediterranean Agriculture (WASAMED).

Expected results:

- To improve regional co-ordination of present and future actions in water saving.
- To establish a Mediterranean-wide convention to strengthen communication and sharing of experience among relevant researchers, decision and policy makers, and end-users
- To develop water saving research projects and actions that meet with the needs and concerns arising from the different Mediterranean contexts
- To facilitate access of different stakeholders to an easy-to-use knowledge-base
- To create a framework and seek consensus to assist regional planning and EU-funding in water resources management for the Mediterranean Region

Target group:

- Irrigation and Extension agents.
- Decision makers at MWI and MoA.
- Researchers.
- Funding agencies.

Partnership:

- University of Jordan, Amman, Jordan
- Jordan Valley Farmers' Association and NCARTT
- 42 Institutions from Jordan, Italy, Syria, Lebanon, Morocco, Egypt, Portugal, Spain, Greece, Cyprus, Turkey, France, Germany and Algeria.

Geographic Coverage:

Mediterranean region.

Funding Sources:

The European Commission

Output:

- Electronic newsletters
- Thematic Video-CDs
- International Conference on Water Saving in Mediterranean Agriculture.
- Final report
- Website for the project

B. Seminars

1. A seminar about the WSSD and MDGs was given by Dr. Shatanawi at the University of Jordan. The seminar introduces the objectives of the World Water Assessment Report and explains to the audience the Millennium Development Goals as related to water. The audience represents the University of Jordan, Ministry of Water and Irrigation and the National Center of Agricultural Research and Technology Transfer.
2. Another seminar was held at the Ministry of Water and Irrigation after the national celebration of the World Water Day (March 22, 2005). The celebration of the WWD includes speeches by Minister of Water Irrigation, the UNESCO Chair (Dr. Shatanawi) and a representative from the NGO's

C. Training Courses

1. A training course was held during the third week of March (20-25, 2005) which coincides with the world water day (March 22). Participation from the Ministry of Water and Irrigation and the Ministry of Agriculture have attended the course.
2. The ninth international course on Wadi Hydrology was held this year at Al-Balqa' Applied University, Jordan (June 20-25, 2005). The theme of this course was about integrated water resources management in wadis using DDS.

D. Conferences and Workshops

1. **International Conference on Water Use Efficiency and Water Productivity (1- 4 October, 2005)**

Expected results:

- Create awareness among water users and decision makers about water saving technology in Jordan and the Mediterranean region.
- Exchange of experience among different countries in the Mediterranean region.
- Establish guidelines and procedures about efficient use of water in the Mediterranean countries.
- Present the finding of research and the experience of participating countries in WUE and Water Productivity and key note speakers.

Target group:

- Farmers
- Irrigation extension agents
- Water resources engineers.

Partnership:

- University of Jordan
- Mediterranean Agronomic Institute in Bari, Italy.

Geographic Coverage:

About 42 institutions (representing universities, government agencies and private sector organizations) from 14 Mediterranean countries.

Funding Sources:

European Commission

Output:

- A book of proceedings of Abstracts.
- Conference proceedings (CD and hardcopy).

2. A National Workshop on Aquifer Vulnerability and Risk in Jordan (28 September, 2005).

Expected results:

- Expose the participants to the importance of protecting groundwater resources.
- Explain the articles and items of the Groundwater Protection By-Law.
- Introduce the new Unit at the MWI concerning groundwater protection.

Target group:

- Decision makers from MWI.
- Members of some national NGO's.
- Professors and researchers from different Jordanian universities.

Partnership:

- Hashemite University.
- UNESCO Chair in Wadi Hydrology
- The National IHP Committee.
- Ministry of Water and Irrigation

Geographic Coverage:

Jordan

Funding Sources:

UNESCO Office, Amman

Output:

- Workshop report.
- Copies of presented papers

E. Missions

1. Participated in the 7th International Cannes Water Symposium (Cannes, France, 27 June–1 July, 2005). A paper was presented entitled "Management of Future Water Supply and Demand for Aqaba City in Jordan" by Muhammad Shatanawi, Ghada Naber and Sawsan Naber
2. Participated in the Second Mediterranean Conference of Water Resources in Mediterranean Basin -WATMED2 (Marrakech, Morocco, Nov. 14-17, 2005). A paper was presented entitled "Watershed Management of Zarqa River Basin in Jordan" by Muhammad Shatanawi and Sawsan Naber.
3. Participated in the Second Regional Consultation Workshop for Preparation of the MENA Region report to the 4WWF in Mexico, March 2006. (Cairo, Egypt, December 14 -15, 2005). The objectives of the meeting are to discuss the draft regional document and input for ministerial declaration; present and discuss the

contentt and structure of the thematic session program; present the first draft to the MENA water report by the World Bank; discuss the AWC regional day events; and discuss the role of the regional committee and logistic for participation in the 4WWF.

IV. Impact

The main objective of the chair holder is the advancement of scientific knowledge related to Wadi system in the Arab States through scientific research and training. Other objectives are to raise awareness among public water planners and decision makers on the importance of managing scarce water resources in arid areas and utilizing and managing flood water of Wadi systems for beneficial use.

A significant number of projects has been attracted by the chair related to water resources management and optimization, irrigation management and gender role in water and irrigation management. The implementation of these projects in Jordan and some Arab status would be a good forum and opportunity of water resources specialists from Arab and European countries to exchange knowledge and experiences. This would have a significant impact on both side of the Mediterranean basin as scientists from the north are exposed to the problem in the south and vise verse. Also, this kind of collaborative research activities will ease the flow of knowledge and technology across the Mediterranean.

The training course on integrated water resources management using an innovative modeling approach has familiarized the trainees with modern tools necessary to get the most out of GIS data for watershed modeling. They learned how to use digital watershed data with hydrological models, how to perform automated watershed delineation using DEM and TIN, and how to perform flood plain delineation from digital elevation and stream stage. The trainees have evaluated this course highly in terms of quality of lecturing, material and topic covered.

The national seminars on managing water resources in the semi-arid region of Jordan has created awareness among public and decision making on the necessity to utilize wasted flood water for the purpose of water harvesting and artificial recharge coinciding with the IHP theme. The workshop about groundwater at risk was a good opportunity to create awareness on this subject. The impact reflected by the number of participants and their involvement was significant.

A new approach in watershed delineation and characterizing has accurately identified the parameters of Zarqa Basin. In doing so many research assistants working with the chair has gained good experience in this field.

The involvement of the chair holder in the establishment of newly founded Arab Water Council will create awareness among Arab States in sharing knowledge and experience of each other. The Chair will be the chief editor of the Scientific Journal of the AWC. This will help in disseminating knowledge and activities in water resources policy formulation and implementation in the Arab Region.

Participation in the international activities has strengthened the knowledge and experience of the Jordanian Scientist in the field of Wadi Hydrology. The participation in the 7th International Water symposium which was held in Cannes, France (23-

27/6/2003) was a good forum to present water resources management in Aqaba Governorate.

The chair holder is a member of:

- a. IHP national committee which acts as an advisory body for the Ministry of Water and irrigation.
- b. He is a member of the founding committee of the Arab World Council
- c. Member in the Wadi Hydrology Network and Ground Water Protection Network of the Arab States.
- d. A member of the Editorial Board of the Journal of River Basin Management (JRBM).
- e. A member of the Editorial Board of Water International Journal.
- f. A chief editor of the Arab Journal for Water Policy (the official Journal of the Arab Water Council).
- g. A member of the Editorial Board of Jordanian Agricultural Science Journal.

V. Forthcoming activities

1. Continue working on the project entitled "Optimization for Sustainable Water Resources Management" (OPTIMA). The project will be carried out jointly with institutions from Austria, Cyprus, Greece, Lebanon, Italy, Turkey, Tunisia, Palestine, Morocco and Malta. The Jordan case study will be about Zarqa river basin.
2. Continue carrying out the activities of the "Deficit Irrigation for Mediterranean Agricultural Systems" (DIMAS) project. The project is in collaboration with institutions from: Spain, Greece, Italy, Jordan, Morocco, Tunisia and Turkey.
3. Continue working on the on going EU projects of IRRIMED, WASAMED and MEDCAOSTLAND and start with the new projects: GEWAMED and MELIA.
4. Participate in the celebration of the national water day on 22/3/2006. This activity will be carried out jointly with Ministry of Water and Irrigation, National IHP Committee, the UNESCO Chair, and local NGO's.
5. Organize a one-day seminar at the Mu'ta University in 2006 in the field of "arid land hydrology". The seminar will be jointly organized by the UNESCO Chair, the National IHP Committee and Mu'ta University.
6. Participate in the 8th International Cannes Water Symposium which will be held during the period 27-30 June, 2006.
7. Participate in the Regional Conference on Arab Water 2006: Action plan for integrated development.
8. Supervise two Ph.D. students and one M.Sc student working in the areas of hydrology of river basin, water resources economics, and irrigation management in arid area of Jordan.
9. Participate in the Arab Networks of Wadi Hydrology and Groundwater Protection workshops and meetings.
10. Organize the 10th International Course in Wadi Hydrology which will be held in July, 2006.