



FINAL EVALUATION REPORT

DEVELOPING RENEWABLE
GROUNDWATER RESOURCES IN ARID LANDS
A PILOT CASE: THE EASTERN DESERT OF EGYPT

Submitted to

UNDP Egypt Country Office

Submitted by

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List of Acronyms

ACSAD:	The Arab Center for the Studies of Arid Zones and Dry Lands
APR :	Annual Project Report(s)
CU :	Cairo University
CEDARE:	Center for Environment and Development for the Arab Region and Europe
EWP :	Egyptian Water Partnership
GEF :	Global Environment Facility
GIS :	Geographical Information System
IC :	International Consultant
IR :	Inception Report
ICARDA:	Center for Agricultural Research in the Dry Areas
MALR :	Ministry of Agriculture and Land Reclamation
MWRI :	Ministry of Water Resources and Irrigation
NWRC:	National Water Research Center
NWRP:	National Water Resources Plan
PI :	Principal Investigator
PIR :	Project Implementation Report(s)
PM :	Project Manager (National Project Director)
SC :	Steering Committee.
STL :	Science Team Leader
TL :	Team Leader
ToR :	Terms of Reference
TRP :	Targeted Research Project
TRMM :	Tropical Rain Measurement Mission
TSKL :	Task Leader
UNDP :	United Nations Development Program
UWM :	University of Western Michigan
WFP :	World Food Programme

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1.0 Executive Summary

1.1 Brief description of project

The Eastern Desert Project (EDP) is a targeted research project that is funded through the Global Environmental Facility (GEF), implemented through the United Nations Development Programme (UNDP) and executed by Cairo University in collaboration with the Ministry of Water Resources and Irrigation in Egypt. The immediate objective of the project is to develop a replicable integrated technique for evaluating the extent of renewable ground water resources in arid lands, with the Eastern Desert of Egypt as the test site. The project aims to contribute to the development of non-conventional water resources, and hence assist Egypt, and through replication, other countries in arid regions, in achieving its national goals of meeting the increased demand of water while alleviating pressure on its surface waters and freshwater ecosystems.

According to the project plan, a Methodology for Developing Groundwater Resources in Arid Lands should encompass the use of various geochemical and isotopic techniques, surface and ground water modelling, analysis of satellite images and digital elevation data, seismic and drilling data, field observations and exploration of development scenarios. Accordingly, implementation of the methodology should lead to a more accurate estimation of the available groundwater water resources, their distribution, quantity, and development potential.

The realisation of the project also includes assessment of adverse ecological effects that could result from the exploitation of the investigated freshwater resources and provision of in-country and out-of-country scientific, technical, and research-oriented training and outreach activities centring on the assessment of alternative water resources.

1.2 Context and purpose of the evaluation

The purpose of a final evaluation of GEF/UNDP projects is to assess the achievements of the project against its original objectives and provide donors, government and project partners with an independent review of project final outputs.

The EDP review process included technical, financial and managerial aspects of the project in order to estimate the project relevance, performance and success. GEF project review criteria, such as stakeholder participation, cost-effectiveness and sustainability, are applied in this process. The evaluation identified factors that have facilitated or impeded the achievement of objectives; that resulted in recommendations and lessons learnt for either the execution of similar projects or for a further implementation of the developed methodology in Egypt and elsewhere.

The evaluation encompassed a desk review of project technical and management documentation, a mission to Egypt (including attendance of the final project workshop and interviews with stakeholders) and the compilation of findings and conclusions in a final evaluation report.

1.3 Main conclusions, recommendations and lessons learned

1.3.1 Main conclusions

The final evaluation has confirmed that all the expected project results have been achieved, with the exception of the Environmental Impact Assessment (EIA). It is understood that this on-going activity will be completed next month. Then the conclusion can be drawn that this project has produced all the expected results and achieved its immediate objective.

The main achievement of this project is the development of a cost-effective, replicable integrated technique for the assessment of alternative renewable groundwater resources in arid lands. A technology transfer and improved cooperation and attention provided for Eastern Desert and similar areas are additional main successes of the project.

The main conclusions with respect to the developed methodology are as follows:

- The methodology consists of 'classical', and logical, steps commonly used in hydrogeological investigations. It also contains a number of very useful novelties, such as the integration of technologies, the structured use of satellite imagery and the implementation of advanced ICT. As such, the methodology can, and should, certainly be used while developing groundwater resources in similar arid and semi-arid regions.
- The methodology is clearly integrated, and not an accidental collection of various methods and techniques. The implementation of the methodology from regional to local assessment, including field verification, shows all the advantages of an integrated approach.
- The structured use of contemporary global satellite data sets is one of the highlights of the methodology. In areas characterised by a lack of field data, the use of advanced satellite images to create mosaics such as digital elevation model and precipitation coverage is simply essential for regional studies.

The conclusions given below are about the project performance and long-term benefits:

- The amount and quality of work produced and the results achieved in this project give a strong overall indication of the high cost-effectiveness of the project. Given the relatively low wage rates typical of the Egyptian labour market, the high dedication and extraordinary effort made by the project team enabled the accomplishment of the project.
- The benefits of the EDP will certainly perpetuate after the project completion because the project results are now being used routinely by two main institutions engaged in the assessment and development of groundwater resources in Egypt: the Ministry of Water Resources and Irrigation, which is primarily responsible for the development of Egypt's water resources, and the Faculty of Engineering at Cairo University, which is largely responsible for advancing the research in this area.

- The promotion and dissemination of project-related information in the EDP has been impressive. It has been implemented through various national and international events, articles in renowned international journals, awareness and promotion material, extensive project documentation and a web-based project portal. The web-based project portal contains an information system and it is extremely important for sustainability of the project benefits.
- The EDP provided a solid regional study of the test area. However, the complete methodology, including a local study steps, is applied only in several wadies. Further local assessment in the area, which is very much needed, should be based on the valuable information and experience obtained during the EDP execution.

1.3.2 Recommendations

The first set of recommendations is related to the completion of the project. The recommended actions are necessary for the project completion.

- Environmental Impact Assessment needs to be rounded off.
- A final project report needs to be completed.
- The final project report should include a summary of baseline conditions at the beginning of the project execution (2002).
- A brochure (4-8 pages) about the Methodology for Developing Groundwater Resources in Arid Lands should be produced and distributed to relevant organisations (ministries, research institutes, universities, NGOs) in countries where this methodology has replication potential.

The following set of recommendations is about the imbedding of the developed methodology at the MWRI and CU, and about further implementation of the developed methodology in Egypt and elsewhere:

- Additional field investigations in Eastern Desert, for the purpose of local assessment, should be planned and executed. In the next project phase, about 20-30 wells should be drilled and constructed in all major types of potential groundwater reservoirs.
- The developed methodology should be applied in the Sinai Peninsula in synergy with the on-going assessment of groundwater potential in that region. Moreover, further contacts should be made with neighbouring countries to ensure extrapolation of the EDP results to the region¹.
- The web-based information system developed in this project should be regularly updated and extended to receive data from other regions in Egypt. The technical part of this task is the responsibility of the Information and Decision Support Department of the MWRI. However, the content of the updates is common responsibility of the Groundwater Department at MWRI, NWRC and Cairo University.

¹ see the recommendation on brochures given above

- Realisation of a development action plan for Eastern Desert needs to be continued with the revival of the inter-ministerial committee and the coordination of the Planning Sector of the MWRI. The EDP findings should be incorporated in the currently revised National Water Resources Plan in such a way as to guide further water resources development in Eastern Desert region of Egypt.
- A joint proposal could be made regarding further cooperation between Cairo University, supported by UNDP, and the World Food Programme. The proposal should be submitted to both the MWRI and MALR with a request for joint financing from these two, and perhaps other ministries. This is a recommendation of the leader of the WFP project “Development of Bedouin Communities”.

1.3.3 Lesson learned

A GEF International Waters Experience Note on EDP is prepared and made available on-line via the website <http://www.iwlearn.org/>. The main lessons learnt are listed below:

- Continuity in terms of time in the project should be secured as much as possible during both the development formulation and implementation of the project. Within these phases, continuity of people involved should be secured as well. Institutional framework ought to be capable of providing continuity between the project development and project implementation phase.
- In complex projects, where various organisations and various disciplines join to achieve common goals, the agreements on the roles, responsibilities and ownership of the future partners need to be included in a project document.
- Management of the project through a task-based, deliverable-oriented grant distribution, as implemented in the EDP, appears to be far more efficient than the lump-sum payment procedure. Also for that reason, the project tasks need to be clearly detailed in the Inception Report.
- Feasibility of possible additional (unplanned and unbudgeted) project activities should be carefully examined.
- Non-technical activities required to contribute to the achievement of a long-term development objective also need to be specified and budgeted in the project document.
- The Eastern Desert Project makes a unique example of the development of the equal project partnership between Cairo University and the governmental departments/institutes. This precedent should be appreciated and further developed in practice.

2.0 Introduction

This chapter describes the purpose of the evaluation, the key issues addressed, the methodology used and, finally, the structure of the evaluation. As such, it provides brief guidelines for reviewing project information and assessing the project's most relevant criteria.

2.1 Purpose of the evaluation

The final project evaluation is a standard part of the UNDP/GEF Monitoring and Evaluation (M&E) policy for all regular and medium-sized GEF-supported projects. In principle, the evaluation is most effective when carried out after the full completion of the project activities. At the moment of writing this evaluation report, the EDP is about to be completed, but missing the final project report. Nevertheless, the information provided by PM, UNDP and interviewees seems to be sufficient for an independent and complete evaluation of the project.

The purpose of the final evaluation is to assess the relevance, performance and success of the project. An estimation of a project's potential impact in terms of contribution to capacity development and the achievement of global environmental benefits is also a part of the final evaluation. Finally, identification and extraction of lessons learned is carried out during this process, providing recommendations for other UNDP/GEF projects. Besides being addressed in the final evaluation report, the lesson learned ought to be published on www.iwlearn.net in a form of GEF IW Experience Notes.

The performance of the project, including the outcomes, is a central issue of the evaluation, reflecting its relevance and future impact. The evaluation concentrates on the technical and managerial aspects of the project execution, following the realization of project tasks (efficiency) and the achievement of project objectives (effectiveness). A thorough insight in the project performance and the factors that facilitated or hindered the project execution, gives a solid basis for an evaluation of the project success and impact at the stage of project execution. More complete evaluation of the project's impact will be possible a few years after project completion.

2.2 Key issues addressed

The key issues addressed in the evaluation are prescribed in the evaluation ToR as:

- Analysis of the attainment of global environment objectives, outcomes, impacts, project objectives and delivery and completion of project outputs based on indicators;
- Evaluation of project achievements according to GEF Project Review Criteria:
 - Implementation approach;
 - Country ownership/drivenness;
 - Stakeholder participation/Public involvement
 - Sustainability;
 - Replication approach;
 - Financial planning;
 - Cost-effectiveness;

- Monitoring and evaluation

These issues have been incorporated in each evaluation activity (see the following section) and used as the main criteria while structuring the evaluation outcome (Section 2.4). Although targeting various aspects of the project, the criteria listed above are very much interconnected, ensuring a thorough consideration of the project relevance, performance and success.

2.3 Methodology of the evaluation

The methodology used to carry out the evaluation consisted basically of three steps:

- A review of basic project documentation
- Mission to Egypt
- Compilation of findings and conclusions in a final report

Prior to the mission to Egypt, the basic project documentation was made available by UNDP, namely: the Project Document, the Annual Project Reports (APR) and the Project Implementation Reports (PIR). Upon request, a Mid-Term Evaluation Report and a template for IW-LEARN Experience Note have been provided as well. Lacking more extensive information on project results, the project reviewer additionally reviewed two project-related articles recently published in the Journal of Hydrology (see References in Appendix V).

The mission to Egypt included:

- Attendance of the Final Dissemination Workshop
- Interviews
- Further review of the project documentation

The ToR for the final evaluation states that “the mission should also rely on information gathered through field visits, if deemed necessary”. During the mission to Egypt, no field visits were undertaken, primarily because of the fact that a very few evidences of the project are physically present in the field (e.g. the wells in the Wadi Qena). Checking location of the wells, for instance, would not really contribute the evaluation of the project, and the costly time of the mission (the test sites are very remote) would be substantially reduced.

Instead of the field visits, the core of the mission was the Final Dissemination Workshop, held in El-Sokhna, 24-25 of December 2008. During the workshop, a number of interviews were conducted with representatives of governmental institutions and NGOs (see List of Interviewees in Appendix 3). The interviews with the representatives of Cairo University were conducted in Cairo.

The Project Manager (PM) provided the project reviewer in Cairo extensive project documentation before departing to the workshop. Therefore, the remaining part of the mission was spent reviewing the documentation and seeking the answers on immediate questions from the project team members and UNDP.

Some additional documentation such as actual financial overview, the list of workshops/trainings, etc, was provided after the completion of the mission. Together with the technical project documentation, this information was used while sorting out the findings and compiling the report.

2.4 Structure of the evaluation

The structure of the evaluation reflects the key issues and the purpose of the evaluation. The same structure can be recognized in the Questionnaire used to conduct the interviews (see Questionnaire in Appendix VI). Hence, the evaluation is structured in such a way as to encompass the main elements of the assessment:

- Project formulation
- Project implementation
- Results
- Recommendations and Lesson Learned

All the GEF Project Review Criteria are represented in one or more elements of the evaluation structure. The implemented structure allowed for almost immediate focusing on key issues of the evaluation. The evaluation findings, conclusions and associated rating are presented in Chapter 4.

3.0 The project and its development context

Chapter 3 introduces the project, its time frame, the content and the purpose. A distinction between immediate and development objectives of the project deserves special attention. The development context of the project is elaborated on in Section 3.2 and the development objective specified in Section 3.3. Achievement of the development objective can be evaluated through the impact that the project implementation and the project results have made. In order to achieve the immediate (technical) project objective, a set of activities is planned and budgeted. The expected results of these activities are listed in Section 3.5, after the main project stakeholders are briefly described (Section 3.4).

3.1 Project start and its duration

The project started in July 2002 and it was originally planned to last 36 months. At the moment of preparation of this final evaluation report (December 2008), the project was not yet fully completed. However, it is estimated that not more than a month should be needed to round off the remaining activities.

A draft proposal of this project was submitted to GEF exactly ten years ago; in December 1998. This long time span from proposal to realisation has had a certain impact on the project. The project was envisaged as a 'targeted research' project and the immediate project objectives were defined accordingly as a set of technical, applied research objectives. Following the same logic, the leadership of project execution was assigned to Cairo University. The project document also contains a definition of a very relevant development objective. In this document, a development aspect of the problem is used merely as a framework for the research, technical objective, without any elaboration of development related activities.

In the meantime, inspired by UNDP's development experience, GEF emphasized the importance of strengthening the linkages to national development priorities in UNDP implemented projects. Specifically for this project, this has led to the recommendation of the Mid-Term reviewers to introduce a socio-economic policy and development linkages to the project's technical activities. Accordingly, additional activities were added to the project, requiring additional time as they involve extensive coordination, consultation and negotiations among various partners. The Steering Committee, following the recommendations of the Mid-Term Review, approved a one-year extension of the project, but no additional budget was granted.

The additionally introduced non-technical component of the project was not the only reason for the project delay; finding and keeping the balance between research and development, technical and non-technical issues, the university and the ministry was one of the challenges of this project. This demanding and time-consuming process was also a reflection of the stockholder's (i.e. project partner's) background, ways of working and position or interest in this project.

Some delay has been caused by usual project execution stoppages such as delays in equipment delivery and installation, unforeseen developments in the field, etc. However, the main reason for the project extension, rather than delay, was the additional, valuable effort to extend the development dimension of the project and to strengthen cooperation among the project partners.

3.2 Problems that the project seek to address

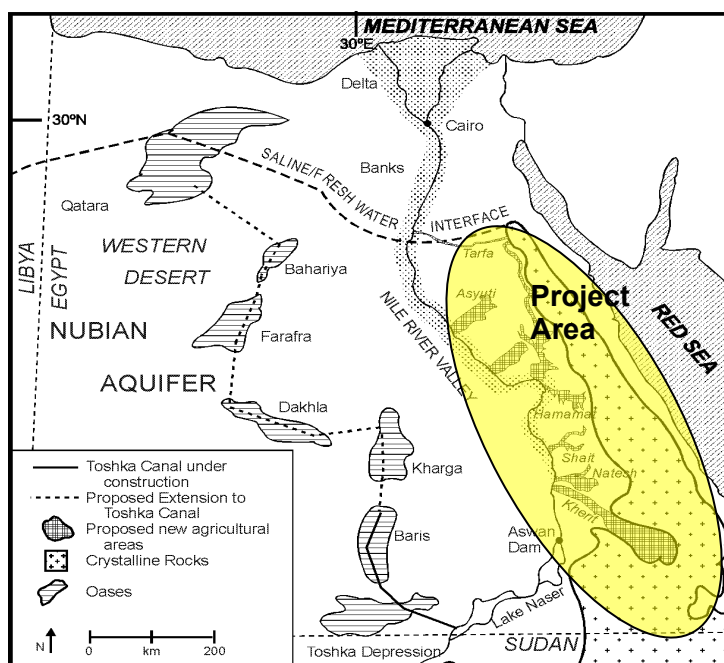
This project seeks to address a problem of water shortage in the arid and semi-arid regions by exploring opportunities for development of renewable groundwater resources.

Arid and semi-arid countries worldwide are facing continuous increases in demand for fresh water supplies, mainly due to population growth and limited water supplies. These problems are exemplified in countries of Saharan Africa (North Africa) and the Middle East where scarcity of water resources contributes to political instabilities, disputes, and conflicts. Studies have shown that the number of countries unable to meet their water needs to be self-reliant in food production were 12 in 1993, 16 in the year 2000, and will be 18 by 2025.

Sources of fresh water supplies in these areas include: surface runoff (e.g. River Nile in Egypt and Sudan) that generally originates from allochthonous precipitation over distant mountains located in wetter climates and groundwater resources that originated as autochthonous precipitation that recharged the aquifers in previous wet climatic periods (e.g., Nubian Aquifer in Egypt, Sudan, Libya). Nowadays, groundwater from the Nubian Aquifer is being extracted extensively for irrigation in the oasis and lowlands of the Western Desert of Egypt (e.g., Kharga, Dakhla, Farafra), eastern Libya (e.g., Kufra Basin), and northern Chad. As a consequence, the naturally flowing springs in many of these oases and lowlands have dried up and groundwater levels have been dropping for decades due to excessive pumping. Looking for alternative water resources, additional to River Nile and Nubian Aquifer has become a necessity.

In many arid and semi-arid countries worldwide, sporadic precipitation occurs over mountainous areas and is channelled throughout extensive watersheds as surface runoff and subsurface groundwater flow. Within these watersheds, networks of minor valleys join into main valleys that ultimately drain into other water bodies (e.g., oceans, lakes, and rivers). Because some of the watersheds collect precipitation over large areas and channel it through a few main valleys, substantial amounts of

freshwater could potentially recharge the alluvial aquifers flooring these main valleys during sporadic storms. This project was initiated to investigate the distribution of these alluvial aquifers and their recharge rates and the Eastern Desert of Egypt, in the figure on the left, was selected as the test area. A methodology to be developed for the test area should be reusable in other similar areas.



Egypt has been chosen as a test site for this project for several reasons. Firstly, Egypt's landscape and its climatic and hydrologic settings are ideal for this study and it resembles these settings in neighbouring countries. Hence, results obtained in Egypt can be used as a model and will be applicable to many neighbouring countries. Secondly, like many arid countries, Egypt relies almost exclusively on its surface water: Nile River, and its fossil groundwater: Nubian aquifer. After preliminary identification of areas in Egypt that are most likely to yield renewable water resources Eastern Desert was chosen over the Sinai peninsula, mostly because extensive coverage of various relevant data was readily available for the Eastern Desert, but not for the Sinai peninsula.

Regarding the problems that the project originally addressed, it should be noted that some analysis of the non-renewable groundwater (Nubian Aquifer) in the test region has also been included in the project activities. This was practically unavoidable given the fact that a part of the groundwater residing in shallow alluvial aquifers originates from Nubian Aquifer, so that the distinction between fossil water and water of meteoric origin needed to be investigated. The analysis was restricted only to a part of paleo-water that ascends along deep-seated faults to the alluvial deposits. If the fossil groundwater would be intercepted before it makes it to the Nile River and at a rate that does not disrupt the existing steady state groundwater flow regime, a sustainable exploitation of this groundwater resource could probably be attained.

3.3 Immediate and development objectives of the project

As stated in the project document, the immediate objective of this project is to develop a replicable integrated technique for evaluating the extent of renewable ground water resources in arid lands, with the Eastern Desert of Egypt as a test site.

Although the main activities of the proposed project are technical by nature, development of techniques for the assessment of alternative water resources in arid areas, in Egypt and elsewhere, will on the long-run produce benefits to the population in general and the farming community in particular and to the economy. In Egypt, it is expected that the farming community in Upper Egypt, a community that has been neglected for decades, will benefit the most from this pilot project.

The importance of groundwater development, and hence of this project, for the local population in Eastern Desert has already been demonstrated during the fieldwork in the project test areas of Wadi Qena and Wadi El-Nakhil. In Wadi Qena, according to an interviewed project team member the local population was very supportive to the project team during the field exploration, and in Wadi El-Nakhil the project team assisted WFP project "Development of Bedouin Communities" to successfully locate the production wells².

In the project document, a development objective is defined as 'to develop non-conventional water resources, thus assisting Egypt in achieving its national goals of meeting increased demand of water while alleviating pressure on its surface waters and freshwater ecosystems'.

Although defined well ahead of the 2005 National Water Resources Plan (NWRP), the objectives of this project are in full accordance with the NWRP, where the

² Based on information from interviews with the project manager of the WFP project.

development of additional water resources and the creation of living space in the desert are important targets.

3.4 Main stakeholders

The main immediate stakeholders of this project are:

- The Ministry of Water Resources and Irrigation (MWRI) including the Groundwater department, Information Department and the Planning Sector;
- The National Water Research Center (NWRC) including the Research Institute for Groundwater (RIGW) and Water Resources Research Institute (WRI);
- Cairo University (CU) including the Faculty of Engineering and the Faculty of Science;
- University of Western Michigan (USA).

University of Western Michigan (UWM) is listed here because it actively participated in the project. The UWM was officially the project international consultant, and that usually has a connotation of short-term, task related engagement. Nevertheless, UWM specialists contributed substantially to the development of the project methodology and also publicised various aspects of the methodology in well-known research journals. It is worth mentioning that the consultant is awarded two new grants (Sinai Peninsula and Quetta region in Pakistan) because of the success achieved in the Eastern Desert project. Hence, the benefits to the UWM are certainly larger than the sole consultancy fees waged in this project.

The benefits obtained by Egyptian stakeholders will be described in Chapter 4 where the main project findings and results are addressed. Yet, at this place it should be noted that the final and the main beneficiary of this project is the people of Egypt, and particularly the population of Eastern Desert.

In addition to the main stakeholders, the project will be beneficial to educational and governmental institutions in neighbouring countries, particularly in the MENA region, if these countries decide to utilize the project results by replicating the developed methodology³.

3.5 Results expected

According to the Project Document, the main outputs of the project are:

1. Identification of the source, extent, and histories of groundwater in alluvial aquifers under investigation.
2. Development of a rainfall/surface-runoff model, estimation of the timing of the recharge cycle and evaluation of the extent of the renewable groundwater resources recharged by rainwater precipitating over the Red Sea Hills area in the Eastern Desert.
3. Construction of a groundwater flow model, and investigation of groundwater flow in the alluvial aquifers flooring one of the main valleys of the Eastern Desert
4. Production of a replicable model in neighbouring Middle Eastern and Saharan countries, hence contributing to the preservation of freshwater ecosystems in the area.

³ see Chapter 4 for dissemination and training details

5. Assessment of adverse ecological effects that could result from the exploitation of the investigated freshwater resources.
6. Provision of in-country and out-of-country scientific, technical, and research-oriented training and outreach activities centring on the assessment of alternative water resources.

Strictly speaking, the realisation of the 'technical' outputs listed above is taken as the main criterion for the evaluation of the project completion. Expected results in terms of broader, development objectives could be evaluated only through the impact that the project implementation and realised outputs have made (and that will take some time). Further on, because the activities related to the socio-economic and policy component of the project are not clearly identified and budgeted in the project document, their progress within the project lifetime is difficult to evaluate. Hence, expected results, as stated in this section, refer to the planned activities and immediate project objective, whereas the achievement of the development objective is evaluated through the project impact and the benefits gained from the project results⁴.

⁴ see further in Section 4.3

4.0 Findings and conclusions

4.1 Project formulation

A formulation of the EDP started with the initiation of the project proposal and concluded with the initiation of the project. Clearly, continuity in terms of time and people involved is very important for an efficient project formulation. This will be detailed in Section 4.1.1. The EDP stakeholders' participation was secured from the beginning, but the roles and responsibilities of the future partners need to be included in the Project Document, to be discussed in Section 4.1.2. Similarly, a state of the information relevant to the project should be assessed as early as possible in order to define baseline conditions, as is discussed in Section 4.1.3, and reuse lessons that are learnt elsewhere.

4.1.1 Project conceptualisation/design

A draft proposal for the EDP was submitted to GEF in 1998 and the Project Document finalised in 2002. During this long period, the majority of those involved in the project preparation left, leaving the project elaboration and execution to new personnel, including a project manager. Factually, the project agreements were made among the organisations and not individuals, so that organisational commitment to the project was not put at risk by the change of personnel, yet the latter was not helpful to the project. It is worthy to note that this was accentuated by the fact that the Project Document does not contain detailed agreements on roles, responsibilities, and ownership among the future project partners. Therefore, the institutional framework needs to be capable of providing continuity between the project development and project implementation phase. In this project, it would have been helpful if the Memorandum of Understanding (MoU) between CU and MWRI was signed already in the project preparation phase.

In a complex project, where various organisations and various disciplines join to achieve common goals, the basic agreements on issues like those stated above should be a part of a project document. This would substantially speed up the description and particularization of the project tasks and the actual commencement of the project. The definition and assignment of the EDP project tasks described in the Inception Report took more than six months, mostly due to intensive negotiation among the project partners. The elaboration of project tasks as done in the Inception Report should be carried out as much as possible in the project preparation phase. Likewise, relevant information from similar (past and on-going) projects, conducted by international organizations, should preferably be thoroughly analysed prior to project implementation. This would improve incorporation of the lesson learnt and in the case of on-going projects, enhance the integration of efforts.

From the content point of view, the concept introduced and its elaboration in project activities/components seems to be realistic and appropriate with respect to the problem addressed. In the project document, there is no information on the institutional, legal and regulatory setting that indicates any inadequacy of the chosen approach to the problem.

Rating for the project conceptualisation: Satisfactory

4.1.2 Country ownership and the stakeholders participation

Most of the stakeholders in the Eastern Desert Project are governmental departments, institutes and institutions, confirming a strong country-ownership of the project. The governmental representatives were involved in the project proposals from the beginning, showing continuous commitment to the project idea, also in terms of financial commitment.

The main project findings will be incorporated into the National Water Resources Plan that is currently under revision. The intention of the Government of Egypt, and the Planning Sector of MWRI in particular, is to produce a development plan that would be used as guidelines for further water resources developments in Eastern Desert region of Egypt.

Rating for the stakeholder participation: Satisfactory

4.1.3 Baseline conditions

Prior to elaborating and executing a project plan, a state of the information regarding the project area needs to be assessed. Among the project documentation originally provided to the reviewer only two short reports were included with an overview of the initially available information. However, during the interviews at Cairo University the reviewer was presented with extensive documentation on the state of information before the project started, including an initial information processing. Besides, the web-based project portal located at the MWRI <http://gis.mwri.gov.eg/gis> provides various historical data including data on the location of wells and metadata, situation 2002.

Benchmarking available information at the beginning of the project is very much needed for an objective evaluation of the project achievements. It is therefore recommended to provide a summary of baseline conditions, including, for example, the estimation of groundwater potential, if any, and the groundwater use in the final project report.

Benchmarking is not restricted only to the information on the project area. In order to secure a sound basis for the project, experience gained elsewhere should have been collected and analysed by this stage. Accordingly, the EDP team reviewed various documents produced by The Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD) and International Center for Agricultural Research in the Dry Areas (ICARDA). Moreover, a compilation of previous investigations carried in the project region was prepared and made available to UNESCO – IHP Programme specialists for their analysis and possible comments but none have been received so far.

4.2 Project implementation

Evaluation of the project implementation encompasses basically a project management, monitoring and evaluation procedure, stakeholder participation and a financial aspect of the project. The stakeholder participation includes both internal (i.e. among the project partners) and external (NGOs, end-users) cooperation, and the mechanisms for dissemination of project information.

4.2.1 Implementation approach

During the project formulation phase a logical management framework was applied, resulting in an elaborated set of tasks and related agreements included in the Inception Report. In this way a sound basis was created for the coming project implementation. However, project management required substantial flexibility and adaptability during the execution of the defined tasks. Originally, intention was to carry out the tasks as much as possible in an integrated manner, i.e. involving various project partners. Unfortunately, this collaborative approach, correct and desired, did not work in many cases. One of the limiting factors was certainly a way of working among the same partners in the past. Subsequently, sub-tasks were defined and assigned to individual partners, creating a sense of ownership. This sense of ownership appeared to be a very significant contributor to the success of this project. For example, placing the project web-portal at the Information and Decision Support Department of the MWRI certainly increased dedication to its development and maintenance.

The Inception Report was produced in October 2002, containing details of 53 project tasks. The preparation of the Inception Report required a slight amendment of the Project Document; the inclusion of the fossil water of the alluvial deposits and the setting up of the project priorities⁵. The Inception Report was a pillar of the subsequent project implementation. Because of its precision and clarity it can be used elsewhere as an example of proper project preparation procedure. A suggestion is therefore to detail project tasks as much as possible as a part of the project preparation, prior to implementation of the project.

Feedback from periodical Monitoring and Evaluation assessments, including the risk analysis, was also regularly used in project management to adjust or amend some of the project activities⁶.

The main project management challenge was, however, a cooperation among the project partners, namely between Cairo University and the MWRI departments and institutes. Apparently, a common practice in Egypt is that water-related projects involving governmental departments/institutes are also led by these institutions. The usual role of university specialists in those projects is consultancy. In this respect the Eastern Desert Project makes a unique example of development of the equal project partnership between the university and the governmental departments/institutes. This precedent should be appreciated and further developed in practice.

Assigning a leadership of the project to Cairo University was instrumental to this positive development. In principle, the affiliation of the project manager should not be important as long as the project objectives and the personal skills are used as the main criterion for the selection. The Eastern Desert Project is a targeted, applied, technical research project and the selection of a PM from Cairo University was a logical choice. If the realisation of the project development objective was elaborated through a set of (budgeted) activities, the positioning of the PM role within a governmental dept or institute might have been more appropriate. Another option could be, if in accordance with UNDP regulations, to appoint two Principal Investigators (PI) who would coordinate activities under UNDP authority. In any case, this project vividly demonstrated that:

⁵ see Section 3.2

⁶ see further in Section 4.2.3 below

- The relationship between organisations has a strong impact on cooperation at the project level, and
- The choice of a capable PM is much more important than her/his affiliation. A competent PM will find a way to develop cooperation sufficient for the successful project execution, for instance 'precisely defined' tasks and 'sense of ownership' mentioned above.

Generally speaking, activity overlap among universities (theoretical research) governmental institutes (applied research) and consultancies (implementation) is necessary to provide a flow of knowledge. In practice, this overlap can become quite extensive, causing a tension among various kinds of organisations. In this respect, the situation in Egypt is anything but unique. Good cooperation at the project level and feasible agreements at the top level are bringing the improvement.

Rating for the implementation approach: Satisfactory

4.2.2 Monitoring and Evaluation

The progress of Eastern Desert Project has been monitored and evaluated by UNDP, as implementing agency, jointly with the project manager and counterparts on a regular basis. A Mid-Term Evaluation was conducted in 2006. A certain monitoring and evaluation role has also been assigned to the project Steering Committee⁷.

Based on the project document, inception report and progress achieved in previous year(s) (the latter not applicable for the first year), project Annual Plans are produced by project manager. The realisation of the Annual Plans has been monitored through quarterly and annual Project Reports. The reports include essentially evaluation of project performance, comprising project adjustments, lesson learnt and financial situation, and risk analysis. Both description and rating are used to evaluate the project situation.

Feedback from the project evaluation is used by the project manager to adjust, or rather extend project activities. Both Project Manager and UNDP have been advocating adaptive project management. The Project Committee also accepted recommendation of the Mid-Term Evaluation to embark on a socio-economic and policy aspect of the project. Although some success has been achieved, such as the formation of local user associations, a production of a development action plan was obviously too ambitious. Moreover, this additional activity was coupled with a regular project activity, the Environmental Project Assessment, putting an extra burden on the project⁸. This is also a lesson learned for the Monitoring and Evaluation procedure: feasibility of possible additional project activities should be carefully examined.

Rating for the monitoring and evaluation: Satisfactory

4.2.3 Stakeholder participation

The main stakeholders have been actively involved in the project implementation as project partners. Cooperation among the main stakeholders Cairo University and the

⁷ see Section 4.2.3

⁸ see also Section 3.3

MWRI, during the project implementation should be seen as a desirable process of the development of new working relationship⁹.

Cooperation and understanding at higher management levels, than project execution, are also instrumental to this development. In this project, a Steering Committee provided such an opportunity. The Committee has not only given legitimacy to the project activities, it has also been helpful in removing many administrative obstacles. Unfortunately, a change of representatives in the Steering Committee has occurred quite often; that certainly has not contributed to the project continuity and the team spirit building. The same holds for some governmental departments and sectors that have experienced a rapid change at the top management level in previous years.

The stakeholders that are not directly involved in the project execution, as project partners, are the local population and educational and governmental institutions in other arid countries neighbouring countries¹⁰.

No concrete activities were defined in the Project Document to involve local population in the project. Yet some concrete steps were taken in that direction, following a recommendation of the Mid-Term Evaluation and a decision of the Project Steering Committee to reinforce realisation of the project development objective. Besides, useful contacts with the local population were made during the field work and also through cooperation with the WFP project "Development of Bedouin Communities".

Curiously enough, cooperation between EDP and WFP started by coincidence, rather than as a result of the project dissemination campaign; curiously, because the EDP has not been lacking production and dissemination of information about the project and achieved results.

First project website was launched at the University of Western Michigan (<http://www.esrs.wmich.edu>) followed by a mirror site at the Information and Decision Support Department of the MWRI (<http://gis.mwri.gov.eg/gis>). The latter is now an advanced interactive web portal¹¹.

Together with Egyptian Water Partnership (EWP), two national workshops were organised. Also, EWP prepared a 'Water Awareness Kit' for children in Arabic and English. The kit was missing a groundwater component that is prepared with the assistance of the EDP staff. This useful awareness material, with a character named "Drop of Water", has been distributed in schools throughout Egypt.

Flyers of single and double A4 page format have been produced, presenting, in a rather illustrative way, the basic project facts. These flyers are very appropriate for decision makers and some of them for the general public. It is recommended to the PM to produce a brochure, 4 to 8 pages in length, about the newly developed methodology, to be distributed to relevant organisations such as ministries, research institutes, universities and NGOs, in countries where the methodology might be replicated.

The project has been promoted abroad at various occasions. For the regional impact and a possible replication of developed methodology, the most important were Arab Water Regional Conferences in 2004 and 2006 organised by CEDARE. In 2006, a

⁹ see Section 4.2.1

¹⁰ see also Session 3.5

¹¹ Section 4.3.1

special session was dedicated to the EDP, extensively introducing the project to regional water specialists and decision makers.

During the World Water Forum (WWF) in Mexico, the project was presented in the World Bank session as an example of Best Practices. The project presentation in Mexico, and also those held at GEF events in Brazil and India, were attended by the project reviewer as well.

The EDP has produced an extensive project documentation that will soon be made available via the project portal. Finally, several articles have been published in prominent international journals, which is an excellent promotional step for the project and for the developed methodology.

Rating for the stakeholder participation, including dissemination: Highly Satisfactory

4.2.4 Financial Planning

Co financing Type/Source	IA own Financing (mill US\$)		Government (mill US\$)		Other* (mill US\$)		Total (mill US\$)		Total Disbursement (mill US\$)	
	Planned	Actual	Plan.	Act.	Plan.	Act.	Plan.	Act.	Planned	Actual
Grants	0.83	0.83					0.83	0.83	0.83	0.74
Loans/Concession										
Credits										
Equity investment										
In-kind support			0.59	1.29		0.06	0.59	1.35	1.35	
Other (*)										
Totals	0.83	0.83	0.59	1.29	0	0.06	1.42	2.18	2.18	

An overview of financial planning is presented originally in the project document (2002) and is summarized in the figure above. The document shows the breakdown of the GEF grant of \$0.83M by the type of the costs (e.g. personnel, training, equipment, etc.), and the total project budget of \$1.835M with activity breakdown. According to the document, a part of the total budget is spent prior to the start of the project (in total \$0.415M, cash contribution). Hence, the available budget at the beginning of the project was \$0.83M (the GEF grant) and \$0.59M (in-kind contribution of NWRC and Cairo University). Accordingly, the total budget available at the project inception time was \$1.42M.

The amount reported in the project document of \$1.835M is maintained in available APRs (2005-2008) as the originally committed budget. The additional contribution to the project, committed after the project document finalisation, amounts to \$0.76M in the APR for 2008. Hence, the total project budget, excluding contributions spent before the inception was (1.42 + 0.76) 2.18 M\$ as can be seen in the figure above.

The Ministry of Agriculture and Land Reclamation (MALR) contributed an additional \$0.30M, Ministry of Water Resources and Irrigation (MWRI) \$0.40M and the US Egypt Joint Research Programme \$0.06M. Most of the additional contribution provided by the MWRI is spent on digging the wells in Wadi Dara, whereas the MALR financed two production wells in Wadi El-Nakhil (the WFP project)¹². Expenditure of the additional contribution is not further elaborated in APRs.

According to the 2008 APR, disbursement of the GEF grant in June 2008 was \$0.74M. Using UNDP Combined Delivery Reports (2003-2007), both GEF and

¹² see Section 4.2.3

governmental disbursement by activity can be followed, but only to a certain extent. Therefore the table given above does not show the actual total disbursement. It is in general, however, very difficult to keep a complete expenditure record of all governmental in-kind contributions.

In this project a 'delivery-based management' is introduced, applying payment upon completion of the project tasks. Based on APRs, Mid-Term Evaluation and the interviews conducted during the final evaluation, it can be concluded that managing the project through a task-based system and deliverable-oriented grant distribution is seen as far more efficient than the lump-sum payment procedure.

The only major project component not delivered until now is 'Assessment of adverse ecological effects', originally budgeted for \$0.053M. The cost of this activity should be disbursed from the remaining GEF grant after the activity completion.

The amount and quality of work produced and the results achieved in this project give a strong overall indication of the high cost-effectiveness of the project. In face of the relatively low wage rates typical of the Egyptian labour market, the high dedication and extraordinary effort made by the project team enabled the accomplishment of the project.

4.3 Results

Some project findings are already presented in the previous sections on project formulation and implementation (sections 4.1 and 4.2, respectively). This section concentrates on the completion of project outcomes, as being specified in the project document. Since the EDP is a targeted research project, attainment of the technical research objectives, including the development of the Methodology, is evaluated firstly (Section 4.3.1 below). The possibilities for replication of the methodology are evaluated in the Section 4.3.2. Sustainability, addressed in Section 4.3.3 is very much related to realisation of the project development objective. Finally, evaluation of the contribution of this project to upgrading skills of the national staff is given in the closing result section (Section 4.3.4).

4.3.1 Achievement of objectives

The expected project results are listed in Section 3.5. Available APRs and the project documentation confirm that all the expected results of the project have been achieved, with exception of the 'Assessment of adverse ecological effects that could result from the exploitation of the investigated freshwater resources'. It is understood that this Environmental impact Assessment (EIA) will be completed next month. Then the conclusion can be drawn that this project has produced all the expected results and achieved its immediate objective.

Execution of the EIA, which is not really a technical research activity, was obviously not a priority of the researchers at the Faculty of Engineering at Cairo University. Besides, coupling of this regular project activity with additional, demanding and originally not planned preparation of a development action plan slowed down the EIA execution. Therefore, it has been decided to carry out the EIA solely and at the regional level as an on-going activity.

The EDP was formulated as a Targeted Research Project (TRP). Accordingly, the realisation of the research outputs (Project Document, Annex I) has been taken as the main criterion for the evaluation of the project completion. Expected results in

terms of broader, development objectives can be evaluated only through the impact that the project implementation and realised outputs have made (see Sustainability, Section 4.3.2).

The methodology for developing groundwater resources in arid lands, as developed in this project, consists of seven steps or stages:

1. Collection of all available relevant data (including geological, hydrogeological, remote sensing and geochemical data sets) and their transformation into common digital formats,
2. Addressing deficiencies in geochemical and isotopic data,
3. Development and utilisation of web-based Geographical Information System (GIS) for data integration, assimilation and visualisation,
4. Development of conceptual models for groundwater exploration (This step included identification of potential reservoir types and of criteria for their analysis.),
5. Identification of potential reservoirs (using conceptual models developed in the previous step),
6. Additional (mainly geophysical) field investigations in order to verify and refine initial selection, and
7. Modelling to constrain runoff, recharge and discharge.

(A suggestion: the second step could also be called: 'Analysis of water quality and its origin' and the seventh: 'Numerical modelling of identified reservoirs and simulation of development scenarios'.)

From a hydrogeological point of view, the presented methodology consists of 'classical' and logical steps commonly used in hydrogeological investigations. Focusing on techniques used in the methodology, one can argue whether one, for example isotopic or geophysical, method is more suitable than the other, but as long as the hydrogeological community cannot come up with a clearly prevailing preference, a broad discussion within this project does not seem to be necessary. Similar question could also be raised about an optimal extent of geophysical investigations which are somehow often more promising than delivering. Nevertheless, a very good step made by the project team has been to broadly publicise and publish the methodology and its implementation. That allows commenting and discussion about the methodology details in the international research arena, where it eventually belongs; outcomes of discussion can lead only to improvements of the methodology.

Although 'traditional' with respect to its basic composition, the methodology holds a number of very valuable novelties. One of them is certainly the integration. This is clearly an integrated methodology and not an accidental collection of various methods and techniques. Implementation of the methodology steps from regional to local assessment (including field verification) for Wadi Qena showed all the advantages of an integrated approach. It should also be noted that field verification is not the only verification procedure included in the methodology: e.g. regional precipitation derived from satellite images (TRMM) is verified using available field observations.

The structured use of contemporary global satellite data sets is one of the highlights of the methodology. In areas characterised by a lack of field data, the use of advanced satellite images to create mosaics such as digital elevation model and precipitation coverage is simply the necessity for regional studies.

That EDP has been committed to the application of advanced technology is also evident from development of an interactive web-based GIS application. Project data is stored in an ORACLE database and originally deployed through ArcIMS platform of the Western Michigan University. However, enthusiastic GIS developers of the Information and Decision Support Dept of the MWRI were eager to implement a modular and interactive (visualisation, processing and dissemination) tool. This has resulted in the application of a technologically advanced ArcGIS server that is up and running. Although there are still challenges ahead, such as copyrights from Egyptian Survey Authority and possible implementation of OpenGIS, development of this application is not only a fulfilment of immediate project objectives, but also very important for the sustainability of project achievements¹³.

The EDP provided a solid regional study of the test area. However, the complete methodology, including a local study steps, is applied only for several wadies. Further local assessment in the area, which is very much needed, should be based on very valuable information and experience obtained during the EDP execution.

The overall conclusion for the achievement of the immediate objective is: this project has produced a sound methodology for the development of groundwater resources in arid and semi-arid regions. The methodology is successfully tested in the region of Eastern Desert in Egypt.

Rating for the achievement of objectives: Highly Satisfactory

4.3.2 Replicability

The methodology developed in this project could, and should, be used in the development of groundwater resources in regions with comparable hydrological and geological characteristics. The methodology consists of 'classical' steps commonly used in hydrogeological investigations. It also contains novelties such as the integration of technologies, structured use of satellite imagery and the implementation of advanced ICT. As such, the formulated methodology is sufficiently familiar and substantially innovative to attract specialists in the regions with similar groundwater problems. Implementation and verification of the methodology within this project also contributed to replicability of the methodology.

A success of reusing the EDP methodology elsewhere depends on several factors. The availability of data is certainly one of the most important criteria. State of the information regarding satellite imagery and cartography of the region needs to be reviewed beforehand; it might happen that some pieces of information are not freely available; the others need digitalisation or another kind of intensive pre-processing. When the field data is too sparse, the results of the desk studies cannot be verified. Besides, field investigations, such as monitoring and well development, are in general costly, especially if conducted in remote areas.

The methodology is developed using a particular area, Eastern Desert, as a test site. It could be that the methodology is not sufficiently elaborated to encompass specifics that are not encountered in this case study. Hence, the methodology should be seen as guidelines, to be implemented in practice according to the specifics of the new case. Subsequently, new experiences can be used to improve and further elaborate the methodology.

¹³ see Section 4.3.2

The guiding role of the newly developed methodology is very important. In many regions some of the methodology steps have already been implemented. Thanks to the methodology, the regional specialists now have an overview of all the required steps, their role and contribution in the overall assessment. Particularly added value of 'novelties' becomes clearer if those are embedded in an integrated methodology. Eventually, this should lead to easier decision-making and better groundwater assessment. Whether the implementation of the methodology is cost-effective or not for a certain region depends on many factors (the wealth of a country, the need for groundwater development, available data and skilled personnel, etc.). In any case, this methodology provides valuable knowledge that would not become so easily available without carrying out this project.

All the information about the methodology is freely available for potential users and it is in principle self-explanatory. Yet, cooperation with developers of the methodology could be useful since the EDP team might provide training courses, specific guidance or occasional consultations.

Rating for the replicability: Satisfactory

4.3.3 Sustainability

The benefits of the EDP will certainly perpetuate after the project completion because the project results are now being used routinely by two main institutions that are engaged in the assessment and development of the groundwater resources in Egypt: the Ministry of Water Resources and Irrigation, the agency primarily responsible for the development of Egypt's water resources and the Faculty of Engineering at Cairo University that is largely responsible for advancing the research in this area. The web-based information system provided within the Eastern Desert project will certainly encourage and use EDP results. Moreover, there is a Methodology developed and promoted that can successfully be replicated in other locations within Eastern Desert or in similar arid regions elsewhere.

Yet, more should be done to achieve a development project objective that is to eventually develop non-conventional water resources in this part of Egypt. The development project objective was clearly stated in the project document but not complemented with activities and the budget required for its achievement. Realising a lacking of development activities in the project, the Mid-Term reviewers suggested drafting a development plan that should build on gained technical knowledge and include the socio-economic aspect of possible developments. The suggestion was accepted and a Ministerial decree was issued on the establishment of an inter-ministerial committee to carry out this task. Besides, the intention was to combine this activity with the Environmental Impact Assessment (EIA) in order to immediately scrutinise various development scenarios according to their environmental impact. Unfortunately, the time required to undertake consultations with five ministries in preparing and negotiating this activity was too long and the attempt to come up with a development plan before the project completion had to be abandoned. Nevertheless, according to the Head of Planning Sector of MWRI, the intention is to incorporate findings of this project into the National Water Resources Plan (NWRP) that is currently under revision.

Attempting to realise a development plan for Eastern Desert within this project was too ambitious, but the project team has carried out several development activities. For instance, the project team has successfully established four local user associations. Further, in Wadi El-Nakhil the project team assisted a WFP project

Development of Bedouin Communities to successfully locate the production wells. The wells are financed by the Ministry of Agriculture and Land Reclamation, who is executing this WFP project. Apparently there is obvious willingness and the need for continuous assistance of Cairo University, supported by UNDP, and MWRI to the WFP project, since the latter encompasses a number of potential locations for settlement of Bedouin communities.

No financial and economics instruments have been established specifically to this project to ensure the on-going flow of benefits once the GEF assistance ends. Unfortunately, this is often a case in both developed and less-developed countries and it can be seen as one of the shortcomings of the project-based way of working. Once the project is completed, the care about the project results and further development should be taken by involved organisations. However, without clear arrangements, no guarantees can be given about a proper maintenance and further developments of the project results. The technical project results such as software applications should preferably be maintained by governmental organisations to enable continuity and non-project related budget rather than consultancies. The good example of this project is placement of the project portal and related applications at the MWRI.

During the Final Dissemination Workshop held in December 2008, the government officials, including HE Minister of WRI and the Chairman of the Land Use Council were very positive about the project results in terms of replicability and the need for developed methodology. Although no concrete arrangements have been made yet, these statements are very encouraging with respect to beneficial use of project results on the long term.

Rating for the sustainability: Satisfactory

4.3.4 Contribution to upgrading skills of the national staff

As an integral part of the project, an extensive training program has been organised on a number of subjects such as remote sensing, geophysics, surface water modelling (with Watershed Modelling System –WMS software), groundwater modelling (with Groundwater Modelling System –GMS software), groundwater assessment and meteorology.

Most of the trainings lasted 3-6 days, having in average around ten participants. According to information obtained during the interviews, the participants found the courses useful, especially the training on remote sensing. This is an indication about the quality of the course and the contribution of UWM to the technology transfer, but also of a recognised value of remote sensing investigation techniques in arid and semi-arid areas. Indeed, the EDP confirmed that the upgrade of remote sensing knowledge and its application was very useful.

Interviewed participants were very positive about practicality of the training and the training handouts ('I still use them'). Some suggestions for improvement of the trainings include:

- Level of the covered material could be more in-depth.
- Composition of the trainers team could be more diverse, e.g. chemical and agricultural specialists could be included as well.
- Size of the trainers team could be larger.

There is a strong desire from the governmental partners in the project to hold future trainings not only at the university, but also in the ministerial departments and research institutes. These 'in-company trainings' are very common in industry and financing, and less in the world of research. Nevertheless, they can be tailored according to organisational needs and indeed valuable to attend for the participants. Besides, already developed course material can be reused in these training.

Contribution of this project to upgrading skills of the national staff goes far beyond the formal trainings. According to the interviewees, execution of the project has been very educational. Some of them see the implementation of the developed methodology as a road from 'theory to practice'. Besides, several young researchers have been involved in the project; they got a chance not only to enlarge their content knowledge but also to develop their project management and communication skills. In meantime, some of them already proved their qualities also internationally. The contribution of the University of Western Michigan to the transfer of technology and the upgrading skills of the national staff in Egypt was substantial.

5.0 Recommendations

The first set of recommendations is related to the completion of the project:

- Environmental Impact Assessment needs to be rounded off. All the expected results of the project have been achieved with exception of the 'Assessment of adverse ecological effects that could result from the exploitation of the investigated freshwater resources'. This activity should be carried out solely (i.e. without coupling with any additional activity) and pragmatically, having in mind the necessity to officially complete the project.
- A final project report needs to be completed.
- The final project report should include a summary of baseline conditions at the beginning of the project execution (2002).
- It is recommended to the EDP project manager to produce a brochure (4-8 pages in the length) about the Methodology for Developing Groundwater Resources in Arid Lands; subsequently, the brochure should be distributed to relevant organisations (ministries, research institutes, universities, NGOs) in the countries where this methodology might be replicated.

The following set of recommendations is about the embedding of the developed methodology at the MWRI and Cairo University, and about further implementation of developed methodology in Egypt:

- Additional field investigations in Eastern Desert should be planned and executed. The EDP provided a solid regional study of the test area. However, a complete methodology (including a local study steps) is applied only for several wadies. In the next phase of the project, about 20-30 wells should be drilled and constructed in all major types of potential groundwater reservoirs. These production wells will also be used for the definition of hydraulic properties and for the monitoring. The location planning of the wells needs coordination with Ministry of Housing, Utilities and Urban Development and perhaps with the WFP project (see below).
- Developed methodology should be applied in the Sinai Peninsula (in synergy with the on-going assessment of groundwater potential in that region). Moreover, further contacts should be made with neighbouring countries to ensure extrapolation of the EDP results to the region¹⁴.
- The web-based information system developed in this project should be regularly updated and extended to accommodate data from other regions in Egypt.
- Realisation of a development action plan for Eastern Desert needs to be continued with revival of inter-ministerial committee and under coordination of the Planning Sector of the MWRI. The EDP findings should be incorporated in the currently revised National Water Resources Plan in such a way as to guide further water resources developments in Eastern Desert region of Egypt. The plan should assess the prospects regarding both, the locations of

¹⁴ see the recommendation on brochure

further developments and the possible water use (i.e. water supply, tourism, agriculture, etc). The latter should be carried out with awareness that each drop of water belonging to this fragile resource is precious. Moreover, developed resources should be made available to local population who knows how to maximise a value of scarce resources.

- A joint proposal could be made regarding a further cooperation between the EDP and the WFP project and submitted to both the MWRI and MALR with a request for joint financing from these two, and perhaps also other, ministries. In Wadi El-Nakhil the EDP assisted a WFP project Development of Bedouin Communities to successfully locate the production wells. The wells were financed by the Ministry of Agriculture and Land Reclamation, who is executing this WFP project. Apparently, there is obvious willingness and the need for continuous assistance of the EDP to the WFP project, since the latter encompasses a number of potential locations for settlement of Bedouin communities.

The final set of recommendation is for the potential users of the methodology for developing groundwater resources in arid lands as developed in this project:

- The methodology consists of 'classical' and logical steps commonly used in hydrogeological investigations. It also contains a number of very useful novelties such as the integration of technologies, the structured use of satellite imagery and the implementation of advanced ICT. This should certainly be used while developing groundwater resources in similar arid and semi-arid regions.
- The methodology is clearly integrated, and not an accidental collection of various methods and techniques. Implementation of the methodology steps from regional to local assessment, including field verification, shows all the advantages of an integrated approach.
- The structured use of contemporary global satellite data sets is one of the highlights of the methodology. In areas characterised by a lack of field data, the use of advanced satellite images to create mosaics such as digital elevation model and precipitation coverage is simply the necessity for regional studies. Data copyrights and costs of data processing could be constrains for implementation of satellite imagery.
- Development of a web-based portal for data and information storage, visualisation, processing and dissemination is of extreme importance for the fulfilment of immediate and development objectives of the project. Such a portal is very helpful in the preservation of achieved project results and their use as a basis for future investigations. The databases behind the portal are augmentative, ensuring, in technological terms, continuity and enlargement of knowledge about the area. Development of such a web-based database is very much encouraged.

6.0 Lessons Learnt

This closing chapter of the evaluation report contains some lessons that are learnt during the formulation and implementation of the Eastern Desert Project. This valuable experience should be kept in mind during further groundwater explorations in Eastern Desert of Egypt, but also while preparing similar GEF/UNDP projects worldwide. Therefore, a GEF International Waters Experience Note is prepared and made available on-line via the website <http://www.iwlearn.org/>. The main lessons learnt are listed below:

- Continuity in terms of time and people involved in the project should be secured as much as possible during both the formulation and implementation of the project. Although the commitment to the project was made by organisations, and not individuals, the change of personnel was not helpful to the project, also because the Project Document does not contain elaborated partner agreements. Project continuity and the team spirit also did not benefit from the regular changes in the Steering Committee and in the management of some governmental departments and sectors during the project execution.
- In complex projects, where various organisations and various disciplines join to achieve common goals, the agreements on the roles, responsibilities and ownership of the future partners need to be included in a project document. That would substantially speed up elaboration of the project tasks and the actual commence of the project. Definition and assignment of the EDP project tasks (described in the Inception Report) took more of six months, mostly due to intensive negotiation among the project partners.
- Management of the project through a task-based, deliverable-oriented grant distribution appears to be far more efficient than the lump-sum payment procedure. In this project a 'delivery-based management' is introduced, applying payment upon completion of the project tasks. Also for that reason, the project tasks need to be clearly elaborated in the Inception Report.
- Feasibility of possible additional, unplanned and unbudgeted, project activities should be carefully examined in terms of required resources. In this project, a recommendation of the Mid-Term Evaluation to embark on a socio-economic and policy aspect of the project was followed. Although some success has been achieved such as the formation of local user associations, a production of a development action plan was obviously too ambitious. Moreover, this additional activity was coupled with a regular project activity (Environmental Impact Assessment), putting an extra burden on the project. Any additional activity.
- Non-technical activities required to contribute to the achievement of a long-term development objective also need to be specified and budgeted in the project document. In the Eastern Desert Project, a development aspect of the problem is used merely as a framework for the research, technical objective, without any elaboration of development related activities. Nevertheless, the realisation of the EDP technical objectives certainly contributed to achievement of the EDP development objective that is to develop of non-conventional water resources in Egypt.
- The Eastern Desert Project makes a unique example of the development of the equal project partnership between Cairo University and the governmental

departments/institutes. This precedent should be appreciated and further developed in practice. Assigning a leadership of the project to Cairo University was instrumental to this positive development. In principle, the affiliation of the project manager should not be important as long as the project objectives and the personal skills are used as the main criterion for the selection. The Eastern Desert Project is targeted, applied, technical research project and the selection of a PM from Cairo University was a logical choice. If the realisation of the project development objective was elaborated through a set of budgeted activities, the positioning of the PM role within a governmental department or institute might have been more appropriate. Another option could be, if in accordance with UNDP regulations, to appoint two Principal Investigators (PI) who would work under UNDP authority.

During the final evaluation interviews (see Appendix III and IV), the EDP staff was asked about their personal best and worse experience during this project. Two responses will be mentioned here, being found essential for this project, but also for many other GEF/UNDP project worldwide:

Interviewee 1:

- The worst experience: when we cannot agree.
- The best experience: when we agree and do it together.

Interviewee 2:

- The worst experience: when we drill a well and don't find the water.
- The best experience: when we find the water.

Appendix I – Terms of Reference

Terms of Reference for Final Evaluation Developing Renewable Groundwater Resources in Arid Lands, A Pilot Case- the Eastern Desert of Egypt Project (PIMS 1815 - 00012358)

I. INTRODUCTION

The Eastern Desert project is a targeted research project that is funded through the Global Environmental Facility (GEF), implemented through the United Nations Development Programme (UNDP) and executed by Cairo University in collaboration with the Ministry of Water Resources and Irrigation in Egypt. It aims to develop a replicable model for demonstrating different approaches for the integration of renewable groundwater resources of watersheds into national water budgets in arid regions.

The project conducts comprehensive investigations to evaluate the potential and extent of alternative water resources arising from sporadic precipitation over large watersheds in arid and semi-arid areas using the Eastern Desert of Egypt as a pilot site. Several techniques are used in this context, including the analysis of satellite images and digital elevation data, surface and groundwater modeling, seismic, drilling data and field observations. Tasks inferred by the project include rainfall analysis and prediction of design storms, geo-chemical and isotopic analysis of groundwater samples to determine its source, soil sampling, infiltration tests, remote sensing tasks to develop co registered mosaics for geology, land use, soil, and elevations of the entire Eastern Desert of Egypt, surface water modeling for all major *wadies* (narrow valleys), computation of recharge to quaternary basins, geophysical tests, groundwater modeling, and exploration of development scenarios.

The project intended to develop procedures that could be used to accurately estimate the available groundwater water resources, its distribution, quantity, and development potential. They could be applied in Egypt as well as in neighboring countries to enable planning for water resources management with minimum environmental, financial, and social risks. Thus, this project is geared to assist the Government of Egypt – and, through replication, other countries with similar bi-climatic conditions and hydrological regimes – in achieving national goals and policies to meet increased demand of water, and provides valuable input to the national water resources management strategies and plans.

After six years of implementation the project has now reached its closing date and is initiating a terminal evaluation in line with UNDP and GEF policies.

The Monitoring and Evaluation (M&E) policy at the project level in UNDP/GEF has four objectives: i) to monitor and evaluate results and impacts; ii) to provide a basis for decision making on necessary amendments and improvements; iii) to promote accountability for resource use; and iv) to document, provide feedback on, and disseminate lessons learned. A mix of tools is used to ensure effective project M&E. These might be applied continuously throughout the lifetime of the project – e.g.

periodic monitoring of indicators -, or as specific time-bound exercises such as mid-term reviews, audit reports and final evaluations.

In accordance with UNDP/GEF M&E policies and procedures, all regular and medium-sized projects supported by the GEF should undergo a final evaluation upon completion of implementation.

Final evaluations are intended to assess the relevance, performance and success of the project. They look at early signs of potential impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. They will also identify/document lessons learned and make recommendations that might improve design and implementation of other UNDP/GEF projects.

II. OBJECTIVES OF THE EVALUATION

As an integral part of the project implementation cycle, UNDP has initiated a final evaluation that will analyze the achievements of the project against its original objectives while providing donors, government and project partners with an independent review of project final outputs. The evaluation will review technical and managerial aspects and consider issues of effectiveness, efficiency, relevance, impact and sustainability. The evaluation will identify factors that have facilitated and/or impeded the achievement of objectives and should result in recommendations and lessons learned that will help in re-orienting and re-prioritizing project activities and managerial arrangements as needed.

III. PRODUCTS EXPECTED FROM THE EVALUATION

Two main products are expected of the final evaluation; (i) a comprehensive report; (ii) a GEF International Waters Experience Note. The final evaluation should provide **an overall rating** of achievement of the project's objectives.

The final evaluation will be structured according to the following outline, as detailed in Section VII:

- 1 Executive summary
- 2 Introduction
- 3 The project(s) and its development context
- 4 Findings and Conclusions
 - 4.1 Project formulation
 - 4.2 Implementation
 - 4.3 Results
- 5 Recommendations
- 6 Lessons learned
- 7 Annexes

The final evaluation report should not exceed 50 pages excluding annexes and will be submitted to UNDP Egypt, two weeks after the end of the mission. The report will be circulated for two weeks to the government counterparts and project management unit to verify factual statements. Meanwhile any discrepancies between the impressions and findings of the evaluation team and the aforementioned parties these should be explained in an annex attached to the final report.

The GEF International Waters Experience Note will focus on a specific process, theme or best practice of the project worthy of documenting for replication and/or learning throughout the project. This being a demonstration project, the experience note is expected to capture its value. The final selection of the topic will be

undertaken through a consultative process between the project manager, national counterpart and UNDP country office and regional coordination unit. The template of the experience note will be provided to the consultant ahead of time in order to provide an idea of the content and issues that need to be looked at during the evaluation.

IV. METHODOLOGY OR EVALUATION APPROACH

The evaluation will be based on information obtained from reviewing documents such as the project document, project brief, quarterly progress reports, Annual Project Reports (APR), Project Implementation Reports (PIR) and minutes from Tripartite Review, Project Technical Reports and minutes from relevant meetings. The mission should also rely on information gathered through field visits, if deemed necessary, and interviews with target beneficiaries and project staff including government officials, University professors and/or consultants. Interviews should include Cairo University, Ministry of Water Resources and Irrigation (National Water Research Centre, Groundwater Sector, and Central Information Unit), Michigan University and UNDP. Furthermore, the consultant is expected to contact international research centers, academic institutions and other relevant organizations that can provide a professional opinion on the merits and significance of the project and its methodology. The methodology that will be used by the evaluator should be presented in the report in detail. It shall include scrupulous information on documentation review, interviews held; field visits; participatory techniques and other approaches for the gathering and analysis of data.

V. EVALUATION TEAM

The final evaluation will be carried out by an independent international consultant that has not participated in the project preparation and/or implementation and does not have any conflict of interest with project related activities. The expert will be responsible for conducting a mission to Egypt to meet with the stakeholders, and will be responsible for drafting and finalizing the report.

The appropriate evaluator for this assignment shall be a water resources specialist with technical expertise recognized at international level. S/He must have an advanced university degree preferably in engineering/ water science fields with 10-15 years of relevant experience preferably in the groundwater sector and technical issues related to water in developing countries, remote sensing and computer modelling. Previous involvement and understanding of UNDP and GEF procedures is an advantage and extensive international experience in the fields of project formulation, execution, and evaluation is required; experience in science to policy linkages would be welcome. The consultant should be fluent in English and possess strong technical writing and analytical skills coupled with relevant experience in results-based monitoring and evaluation techniques. The consultant's acquaintance with general water resources development related information in Egypt and in particular groundwater is preferred.

VI. IMPLEMENTATION ARRANGEMENTS

UNDP Egypt will contract the consultant and be responsible for liaising with the project team to set up stakeholder interviews, arrange field visits, coordinate with the Government and ensure the timely provision of per diems and travel arrangements.

The consultancy will be for 22 working days and the activities and timeframe are broken down as follows:

Activity	Timeframe and responsible party
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Desk review	4 working days
Mission to Egypt including field visits interviews to the stakeholder	6 working days
Writing draft report	8 working days
Finalization of the evaluation report (incorporating comments received on first draft)	4 working days

VII. SCOPE OF THE EVALUATION- SPECIFIC ISSUES TO BE ADDRESSED

The scope of evaluation includes 2 principal components:

- analysis of the attainment of global environment objectives, outcomes, impacts, project objectives and delivery and completion of project outputs (based on indicators);
- evaluation of project achievements according to GEF Project Review Criteria:
 - Implementation approach;
 - Country ownership/drivenness;
 - Stakeholder participation/Public involvement;
 - Sustainability;
 - Replication approach;
 - Financial planning;
 - Cost-effectiveness;
 - *Monitoring and evaluation*

An annex providing more detailed guidance on terminology and the GEF Project review Criteria is an integral part of this ToRs and is provided in Annex 1.

Please note that some of the categories in the findings and conclusions need to be rated in conformity with the GEF guidelines for final evaluations. The detailed outline of the report should be as follows:

1. Executive summary

- Brief description of project
- Context and purpose of the evaluation
- Main conclusions, recommendations and lessons learned

2. Introduction

- Purpose of the evaluation
- Key issues addressed
- Methodology of the evaluation
- Structure of the evaluation

3. The project(s) and its development context

- Project start and its duration
- Problems that the project seek to address
- Immediate and development objectives of the project
- Main stakeholders
- Results expected

4. Findings and Conclusions

In addition to a descriptive assessment, all criteria marked with (R) should be rated using the following divisions: Highly Satisfactory, Satisfactory, Marginally Satisfactory, Marginally Unsatisfactory, Unsatisfactory, Highly Unsatisfactory

4.1. Project Formulation

Conceptualization/Design (R). This should assess the approach used in design and an appreciation of the appropriateness of problem conceptualization and whether the selected intervention strategy addressed the root causes and principal threats in the project area. It should also include an assessment of the logical framework and whether the different project components and activities proposed to achieve the objective were appropriate, viable and responded to contextual institutional, legal and regulatory settings of the project. It should also assess the indicators defined for guiding implementation and measurement of achievement and whether lessons from other relevant projects (e.g., same focal area) were incorporated into project design.

Country-ownership/Driveness. Assess the extent to which the project idea/conceptualization had its origin within national, sectoral and development plans and focuses on national environment and development interests.

Stakeholder participation (R) Assess information dissemination, consultation, and “stakeholder” participation in design stages.

Replication approach (R) Determine the ways in which lessons and experiences coming out of the project were/are to be replicated or scaled up in the design and implementation of other projects (this is also related to actual practices undertaken during implementation).

Other aspects to assess in the review of Project formulation approaches would be UNDP comparative advantage as IA for this project; the consideration of linkages between projects and other interventions within the sector and the definition of clear and appropriate management arrangements at the design stage.

4.2. Project Implementation

Implementation Approach (R). This should include assessments of the following aspects:

- (i) The use of the logical framework as a management tool during implementation and any changes made to this as a response to changing conditions and/or feedback from M and E activities if required.
- (ii) Other elements that indicate adaptive management such as comprehensive and realistic work plans routinely developed that reflect adaptive management and/or risk monitoring and management/mitigation; changes in management arrangements to enhance implementation.
- (iii) The project's use/establishment of electronic information technologies to support implementation, participation and monitoring, as well as other project activities.
- (iv) The general operational relationships between the institutions involved and others and how these relationships have contributed to effective implementation and achievement of project objectives.

(v) Technical capacities associated with the project and their role in project development, management and achievements.

Monitoring and evaluation (R). Including an assessment as to whether there has been adequate periodic oversight of activities during implementation to establish the extent to which inputs, work schedules, other required actions and outputs are proceeding according to plan; whether formal evaluations have been held and whether action has been taken on the results of this monitoring oversight and evaluation reports.

Stakeholder participation (R). This should include assessments of the mechanisms for information dissemination in project implementation and the extent of stakeholder participation in management, emphasizing the following:

- (i) The production and dissemination of information generated by the project.
- (ii) Local resource users and NGOs participation in project implementation and decision making and an analysis of the strengths and weaknesses of the approach adopted by the project in this arena.
- (iii) The establishment of partnerships and collaborative relationships developed by the project with local, national and international entities and the effects they have had on project implementation.
- (iv) Involvement of governmental institutions in project implementation, the extent of governmental support of the project.
- (v) The involvement of the project steering committee and the extent to which resource persons of the steering committee have been leveraged to support the project in achieving its objectives, ensuring national ownership, leveraging co-financing and managing constraints.

Financial Planning: Including an assessment of:

- (i) The actual project cost by objectives, outputs, activities
- (ii) The cost-effectiveness of achievements
- (iii) Financial management (including disbursement issues)
- (iv) Co-financing

Execution and implementation modalities. This should consider the effectiveness of the UNDP counterpart and Project Co-ordination Unit participation in selection, recruitment, assignment of experts, consultants and national counterpart staff members and in the definition of tasks and responsibilities; quantity, quality and timeliness of inputs for the project with respect to execution responsibilities, enactment of necessary legislation and budgetary provisions and extent to which these may have affected implementation and sustainability of the Project; quality and timeliness of inputs by UNDP and GoC and other parties responsible for providing inputs to the project, and the extent to which this may have affected the smooth implementation of the project.

4.3. Results

Attainment of Outcomes/ Achievement of objectives (R): Including a description *and rating* of the extent to which the project's objectives (environmental and developmental) were achieved using Highly Satisfactory, Satisfactory, Marginally Satisfactory, Marginally Unsatisfactory, Unsatisfactory, Highly Unsatisfactory ratings. If the project did not establish a baseline (initial conditions), the evaluators should seek to determine it through the use of special methodologies so that achievements, results and impacts can be properly established.

This section should also include reviews of the following:

Sustainability: Including an appreciation of the extent to which benefits continue, within or outside the project domain after GEF assistance/external assistance has come to an end. Relevant factors include for example: development of a sustainability strategy, establishment of financial and economic instruments and mechanisms, mainstreaming project objectives into the economy or community production activities.

Contribution to upgrading skills of the national staff: particular attention will be given to impact evaluation of capacity building activities of the project, namely the subsequent use and application of training received and extent of integration of practices and approaches promoted by the project into routine trainee work.

5. Recommendations

- Corrective actions for the design, implementation, monitoring and evaluation of similar projects
- Actions to follow up or reinforce initial benefits from the project
- Proposals for future directions underlining main objectives

6. Lessons learned

This should highlight the best and worst practices in addressing issues relating to relevance, performance and success.

7. Evaluation report Annexes

Evaluation TORs

Itinerary

List of persons interviewed

Summary of field visits

List of documents reviewed

Questionnaire used and summary of results

Comments by stakeholders (only in case of discrepancies with evaluation findings and conclusions)

Appendix II – Itinerary



TRIP SUMMARY AND RECEIPT

Confirmation number: KL XRDKHD
 E-ticket issue date: 28NOV
 Issued by: NL KLM
 NETHERLANDS

Be sure to take the Trip Summary And Receipt with you. Some airports require a Trip Summary And Receipt in addition to your home-printed boarding pass.

Thank you for choosing KLM e-ticket. This is the Trip Summary And Receipt for MR NEBOJSA KUKURIC.

Passenger Name	E-ticket number:	Number Loyalty Program
MR NEBOJSA KUKURIC	0742475141402	

Itinerary Information

Date	Flight	Depart	Time	Arrive	Class	Status	Bag
23DEC	KL553	AMSTERDAM AMS	21:00	CAIRO CAI	T	OK	2PC
30DEC	KL554	CAIRO CAI	04:15	AMSTERDAM AMS	T	OK	2PC

A passport will be required for check-in. If travel plans change, there may be a fee for changing the ticket and different fares may apply. Tickets are non-transferable, and are void if transferred or resold. The e-ticket number will be required for refunds or exchanges.

Receipt

Payment for:	1 PASSENGER
Fare amount:	EUR700.67
Tax/fee/surcharges:	333.67
Method of payment:	
Restrictions:	NONENDO/NONREF/NONREROUTE

Notice

Carriage and other services provided by the carrier are subject to general conditions of carriage, which are hereby incorporated by reference. These conditions may be obtained from the issuing carrier or issuing travel agent.

Warsaw Notice

If the passenger's journey involves an ultimate destination or stop in a country other than a country of departure the Warsaw Convention may be applicable and the Convention governs and in most cases limits the liability of carriers for death or personal injury and in respect of loss of or damage to baggage. See also notices headed "Advice to International Passengers on Limitation of Liability" and "Notice of Baggage Liability Limitations".

Please note that all airlines are required by new security laws in the US and several other countries to give security, customs and immigration authorities access to passenger data. Accordingly, any information we hold about you and your travel arrangements may be disclosed to the relevant authorities in these countries in your itinerary. Your data will only be used for security purposes.

Appendix III – List of interviewees

- Dr. Ahmad Wagdy, Project Manager, Cairo University
- Dr. Mohamed Bayoumi, (Project Overseeing & Monitoring) Assistant Resident Representative UNDP
- Dr Mohamed Sultan, external consultant, Western Michigan University
- Dr. Nahed El-Araby, Director RIGW
- Dr. Mahamed Abdel-Motaleb, Head Planning Sector MWRI, a former head of WRRRI
- Dr. Mohamed Ramy, Director Info & DS Dept. MWRI
- Geo. Shaymaa Ahmed, geologist, Groundwater Sector MWRI
- Gen. Ahmed El-Molla, Project Manager of WFP-project, MALR
- Dr. Hisham Bekhit, Assistant professor, Cairo University
- Eng. Ibrahim El-Hefnawi, Teaching Assistant, Cairo University
- Eng. Hany Gomaa, Teaching Assistant, Cairo University
- Eng. Mohamed El-Kordy, Teaching Assistant, Cairo University
- Dr. Sameh Affifi, (Mid-Term Review coauthor) UNDP
- Dr. Khaled Abu Zeid, Water Resources Management Expert, CEDARE

Appendix IV - Questionnaire used and summary of results

Questionnaire

Interview no:

Datum and place:

Name of interviewee:

Relation to the project:

(At the beginning of the interview the evaluator explains the purpose of the final project evaluation and the role of interviews, being an integral part of the final evaluation).

Project Formulation

- Were you involved in project formulation and – if so - do you have any remarks regarding the project design, country-ownership/drivenness and stakeholder participation at that stage of the project?
- Did a project design phase include experience and lesson learned from previous UNDP/GEF projects?
- Did you have sufficient overview of previous investigations in order to establish baseline conditions?

Project Implementation

- Could you say something about the implementation approach used in this project?
 - Was the framework logical (note: refer to tasks defined in the Inception Report)?
 - Was the project execution sufficiently adaptive to changing conditions (e.g. available technical capacity, relationships among the institutions involved, etc.)?
- Could you briefly elaborate monitoring and evaluation procedure used in this project and give your reflection on its effectiveness?
- How was – in your view- the cooperation in this project? Were all the project parties (i.e. stakeholders) sufficiently involved and committed to the project?
- Were you involved in the project financial planning and/or the financial management and administration? If so, could you pinpoint any project activity having major discrepancy between planned and actual costs? Were the activities (and the project as whole) cost-effective? Did the retroactive disbursement influence the cost-effectiveness of the project? Was – to your knowledge - any co-financing to the project?

Project Results

- Has the project (to your knowledge) achieved the project objectives? Has the project activity you were involved in achieved its objective?
- What are the main benefits of this project? (Note: content/hydrogeological achievements, cooperation, upgrading skills, etc.)
- Do you see those benefits extending after a project completion? (Note: combine with Recommendations)

- Do you see chances for extension/continuation of this project? (Note: combine with Recommendations)

Recommendations and Lessons Learned

- What actions should be taken to ensure continuation of the benefits of this project? Do you have any concrete suggestion/proposal regarding the financing of the project continuation?
- If there was a possibility for continuation of the project, what activities would you suggest?
- What is your best and the worst experience regarding this project?
- What would you do differently if you were to begin this project again?

Summary of the results

In total fourteen interviewed were conducted during this evaluation. All of them (except one with Dr. Sultan) took place during the Final Dissemination Workshop in EI-Sokhna (24-25.12.2008) and the following three days in Cairo.

The questionnaire was prepared beforehand, mostly based on the ToR content and experience of the evaluator. As expected, it was not possible to strictly follow the predefined questionnaire because of very diverse roles that individual interviewees were having in the project. Besides, the time for the interviews during the workshop was quite limited and for the evaluator was the most important to hear the genuine impressions about the project. Therefore, only a few “compulsory” questions are put to all the interviewees.

All the interviews (with no exception) were very cooperative and keen to express their view on the project. Depending on their role in the project, most of them very quickly concentrated on issues such as technical project content, cooperation among the stakeholders, training and dissemination. The individual comments were interwoven in the Final Evaluation Report. (Next to the project documentation, interviews were the most important source of information for the final evaluation.)

In general, all the interviewees expressed their appreciation of the project. While doing that, some interviewees were more enthusiastic, and others were more cautious about extend of the success. Nevertheless, it can clearly be stated that the conducted interviews have confirmed success of the project.

Appendix V – References

- Developing Renewable Groundwater Resources in Arid lands; A Pilot Case Study the Eastern Desert, Project Document, 2002.
- Inception Report, October 2002
- Annual Performance Report (APR) & Project Implementation Review (PIR) for 2005, 2006, 2007 and 2008
- Developing Renewable Groundwater Resources in Arid lands; A Pilot Case Study the Eastern Desert, Mid-Term Evaluation Report, Dr. Abdallah Droubi and Dr. Sameh Afifi, 2006
- EDP Report: Integrated Methodology, January 2008
- EDP Report: Generation of the ArcGIS Server Web Application, January 2008
- EDP Report: Local Assessment & field Verification for Wady Qena, January 2008
- EDP Report: Suggested Drilling Locations from Remote Sensing, GIS, Geophysical and Field data, September 2007
- EDP Report: Generation of ArcIMS web-based GIS, July 2007
- EDP Report: Extension of Fossil Water Aquifers of the Golf of Suez Coastal Plane along Red Sea Coastal Plane, July 2007
- EDP Report: Field Geophysical Investigation (I), December 2006
- EDP Report: Geophysical Investigations in Wadi Dara Area; Previous Studies on Wadi Dara Area, August 2005
- EDP Report: Input Data Report of Wadi Dara, August 2005
- EDP Report: Geochemical and Isotopic Constraints on the Origin of the Eastern Desert Groundwater, December 2004
- EDP Report: Application of Remote Sensing and GIS Techniques for Hydrological Investigation of Wade Systems in the Eastern Desert of Egypt, November 2004
- EDP Report: Sustainable Development of Wady Asuity: A groundwater Flow Model, November 2004
- EDP Report: Surface Water Modeling Tasks (2) 29-32 Wadi Sannour, November 2004
- EDP Report: Surface Water Modeling Tasks (2) 29-32 Wade Qena, October 2002

- EDP Report: Surface Water Modeling Tasks (2) 29-32 ,Wade Abbad, October 2002
- An integrated approach for identifying aquifers in transcurrent fault systems: The Najd shear system of the Arabian Nubian shield, Sultan M. et al, Journal of Hydrology (2008) 349, 475– 488.
- Natural discharge: A key to sustainable utilization of fossil groundwater, Sultan M. et al, Journal of Hydrology (2007) 335, 25– 36
- Project Flyers
- Awareness material of Egyptian Water Partnership
- Presentations from the Final Dissemination Workshop of Eastern Desert Project, El-Sokhna (some presentations were made available, the evaluator was present, taking notes)
- Interview notes (fourteen interviews in total) with the project stakeholders
- Website of the MWRI <http://gis.mwri.gov.eg/gis>
- Website of the Western Michigan University <http://www.esrs.wmich.edu>

Appendix VI – Summary of field visits

The Terms of Reference for the final evaluation states that ‘the mission should also rely on information gathered through field visits, if deemed necessary’. No field visits were undertaken, primarily because due to the fact that very few evidences of the project are physically present in the field (e.g. the wells in the Wadi Qena). Checking location of the wells, for instance, would not really contribute the evaluation of the project, and the costly time of the mission (the test sites are very remote) would be substantially reduced. The mission was therefore planned to coincide with the Final Dissemination Workshop that is held in El-Sokhna, 24-25 of December 2008. The rest of the 6-days mission was spent in Cairo, mostly conducted interviews at Cairo University and UNDP.