EGYPT'S EXPERIENCE IN IRRIGATION AND DRAINAGE RESEARCH UPTAKE

FINAL REPORT

2007

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NWRC

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IPTRID Team

Maher Salman, Technical Officer, IPTRID, NRL

Carlos Garces, Programme Manager, IPTRID, NRL

NWRC Team

Shaden Abdel-Gawad, President, NWRC

Hussam Fahmy, Director, DRI

Maha Tawfik, Director, SRI

Ashraf El- Sayed, Associate Research Professor, DRI

Rasha El- Kholy, Associate Research Professor, NWRC-HQ

Sherif Mohamady, Researcher, HRI

Ossama Gamea, Researcher, CLEQM

Mohamed Abdel Salam, Researcher, ECRI

IPTRID SECRETARIAT

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LIST OF ACRONYMS

BCWUAs	Branch Canal Water User Associations
CIDA	Canadian International Development Agency
CLEQM	Central Laboratory for Environmental Quality Monitoring
CMRI	Channel Maintenance Research Institute
DBS	Delta Breeding Station
DRP-I	Drainage Research Programme
DWQP	Drainage Water Quality Project
ECRI	Environmental and Climate Research Institute
EMGR	Environmental Management of Groundwater Resources
EPADP	Egyptian Public Authority for Drainage Projects
EWUP	Egypt Water Use and Management Project
GIS	Geographic Information System
GoE	Government of Egypt
GS	Groundwater Sector
HAD	High Aswan Dam
HADSERI	High Aswan Dam Side Effect Research Institute
HDPE	High Density Polyethyelene
HRI	Hydraulic Research Institute
IAS	Irrigation Advisory Service
IIIMP	Integrated Irrigation Improvement and Management Project
IIP	Irrigation Improvement Project
IIS	Irrigation Improvement Sector
IPTRID	International Programme for Technology and Research in Irrigation and Drainage
IWRM	Integrated Water Resources Management
MADWQ	Monitoring and Analysis of Drainage Water Quality Project
MALR	Ministry of Agriculture and Land Reclamation
MOH	Ministry of Health
MOI	Ministry of Irrigation
MPW	Ministry of Public Works
MWRI	Ministry of Water Resources and Irrigation
NAWQAM	National Water Quality and Availability Management
NDP	National Drainage Programmes
NRI	Nile Research Institute
NWQMN	National Water Quality Monitoring Network
NWRC	National Water Research Center

NWRP	National Water Resources Plan
PLL	Precision Land Levelling
PVC	Poly-Vinyl Chloride
RDWP	Reuse of Drainage Water Project
RIGW	Research Institute for Groundwater
RNDPS	River Nile Development and Protection Sector
RNPD	River Nile Protection and Development project
SIWARE	Simulation of Water Management in the Arab Republic of Egypt
USAID	US Agency for International Development
WMRI	Water Management Research Institute
WRC	Water Research Center
WUAs	Water Users Associations

UNITS

BCM	Billion Cubic Meter
cm	Centimeter
C^o	Centigrade
feddan	4200 m^2
Kg/ha/yr	kilogram per hectare per year
L.E.	Egyptian pound
lit/sec	liter per second
m	meter
m^2	square meter
m^3 / sec	cubic meter per second
m^3	cubic meter
mil	0.02 mil water
mm	millimeter

ACKNOWLEDGEMENTS

This report has been prepared following a proposal submitted by the National Water Research Center (NWRC) in January 2006 to IPTRID-FAO presenting the approach/ methodology applied by the Center demonstrating the role played by research in formulating and implementing the Ministry of Water Resources and Irrigation (MWRI) policies and practices. The study was carried out by a NWRC team representing the different research activities pursued by the Center under the supervision of the IPTRID technical team.

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The study team was composed of the following members:

IPTRID Team
Maher Salman, Technical Officer, IPTRID
Carlos Garces, Programme Manager, IPTRID

NWRC Team
Shaden Abdel-Gawad, Team Leader – President, NWRC
Hussam Fahmy, Study Coordinator – Director, DRI
Maha Tawfik, Team Member – Director, SRI
Ashraf El- Sayed, Team Member – Associate Research Professor, DRI
Rasha El- Kholy, Team Member – Associate Research Professor, NWRC-HQ
Sherif Mohamady, Team Member – Researcher, HRI
Ossama Gamea, Team Member – Researcher, CLEQM
Mohamed Abdel Salam, Team Member – Researcher, ECRI

PREFACE

The International Programme for Technology and Research in Irrigation and Drainage (IPTRID) is a multi-donor Trust Tund managed by the IPTRID Secretariat as a Special Programme of FAO. The Secretariat is located in the Land and Water Division of FAO. IPTRID acts as a facilitator mobilizing the expertise of a worldwide network of leading institutions in the field of irrigation, drainage and water resources management.

IPTRID aims at improving the uptake of research, exchange of technology and management innovations by means of capacity development in the irrigation and drainage systems and sectors of developing countries to reduce poverty, enhance food security and improve livelihoods, while conserving the environment. The Programme therefore is closely aligned with the Millennium Development Goals. The IPTRID Secretariat, together with its partners, provides advisory services and technical assistance to countries and development agencies, for the formulation and implementation of strategies, programmes and projects.

The National Water Research Center (NWRC) was established in 1975 to be the research arm of the Ministry of Water Resources and Irrigation (MWRI) to support directly the development and management of Egypt's water resources system. Since then it has been very active in different branches of water sciences and has put forth significant effort to disseminate its research findings and results as widely as possible through diverse routes. Research carried out by the NWRC institutes has strongly contributed to the outlining and proposing of long-term water resources policies in Egypt, solving the technical and applied problems associated with general policies for irrigation, drainage and water resources, conducting investigations and research in relation to efficient and cost effective means for water resources utilization, and proposing measures for environmentally sound development of the irrigation and drainage system.

Regardless of the mass of research produced and its field applications, there are claims of a gap between research and practice. During the International Water Resources Association Congress in November 2005, Delhi, India, the NWRC organized a workshop titled "30 Years of Research and Development towards Egypt's Water Resources Management". At that time, the NWRC was approaching the end of the sixth five-year plan and was still facing research typical cliché accession of research-practice gap. Therefore, it proposed to the congress organizers, namely the NWRC, to allow to show briefly successful examples of research uptake, coming from the Egyptian experience. While going through this exercise, the need for analysis of the water research uptake process in a country like Egypt was experienced. Analysis of Egypt's long experience, in the field of water resources research, will not only support national water research, but it can also inspire and stimulate water research reform in the surrounding region.

In January 2006, the NWRC, as an IPTRID country partner, together with the IPTRID Secretariat worked on a proposal for an analytical study of Egypt's experience in irrigation and drainage research uptake. Based on agreed outlines, the NWRC submitted to IPTRID a proposal to present the approach/methodology applied by the Center demonstrating the role played by research in formulating and implementing the MWRI policies and

practices. The proposal was in line with the IPTRID mission to focus on the improvement of research uptake, the exchange of technology and management innovations; and hence IPTRID agreed to support the NWRC to conduct a study on the Egypt's Experience in Irrigation and Drainage Research Uptake. Thus, IPTRID and NWRC joined hands to carry out this activity.

In April 2006, a working team of eight national experts from NWRC (Team Leader, Study Coordinator, Senior Researcher and five Junior Researchers) was formed with knowledge and experience on research activities carried out by the NWRC, and the research uptake process that took place over the last thirty years in Egypt. While embedded in the process of identification, analysis and documentation of research uptake in Egypt, it was important to assert that the approach/methodology applied by the NWRC for carrying out research uptake was the ultimate delivery expected from the study. This report reflects the relevance and depth of the applied methodology, the quality of the activities undertaken as well as the importance and weight of the recommendations reached.

IPTRID and NWRC see the Egypt study as a first step in a regional effort that will explore how to enhance the transfer of research knowledge all the way down to the ultimate beneficiaries, namely the farmers.

Carlos Garcés-Restrepo
IPTRID Programme Manager

Shaden Abdel-Gawad
NWRC President

EXECUTIVE SUMMARY

Due to arid conditions, Egypt depends mainly on irrigated agriculture (99.8 percent of the cultivated area) to produce food and fiber for its large mass of population. Therefore, the agriculture sector poses the highest pressure on the water resources system. Seventy-nine percent of the national water requirements go to agricultural sector, while the industry and domestic annual requirements consume 9.5 and 5.0 Billion Cubic Meters (BCM), (14 percent and 7 percent respectively of the national water demand). Egypt's annual water requirements are estimated at 70.0 BCM; if compared with available resources, the result would be a significant deficit. The total annual available water resources are 57.7 BCM; divided into 55.5 BCM of Nile water released from Lake Nasser, 1.3 BCM of effective rainfall and 0.9 BCM of deep groundwater. The per capita share of available water resources in year 2000 was 859 m^3, and this is expected to decrease to 720 m^3 per year by the year 2017. To overcome this shortage, part of the agricultural drainage is reused, besides the use of shallow groundwater and other non-conventional resources.

The Ministry of Water Resources and Irrigation (MWRI) is the official authority in charge of development, allocation and distribution of all conventional and non-conventional water resources of the country. In order to achieve its goals, MWRI has realized the role of research in formulating its policy before even having a formal comprehensive water policy. The research and technical studies date back to the Nineteenth century. Survey research, hydrologic studies and Upper Nile expeditions started as early as 1870.

In 2002, MWRI started to formulate the National Water Resources Plan (NWRP) based on a strategy called 'Facing the Challenge'(FtC) (NWRP, 2005). FtC included measures to develop additional resources, make better use of existing resources, and measures in the field of water quality and environmental protection. The plan has three major pillars: (1) increasing water use efficiency, (2) water quality protection, and (3) pollution control and water supply augmentation.

The water policy development in Egypt faced a number of challenges; mainly the mismatch of water supply and demand that resulted from increasing demands for water in all socio-economic sectors. The rate of demand growth is linked directly to the growth in population and the improvement of the standards of living. In addition, the available water resources in Egypt are limited and the rate of its development is much slower than the rate at which demand increases. This means that the gap between available resources and water requirements is getting wider over time and Egypt will be facing water scarcity in the near future.

The distribution of the water of the Nile River is nearly uniform from Aswan to Cairo with a fairly good quality due to the Nile system of self-purification. Nevertheless, the pollution increases in the two Nile branches towards north as they receive nutrients, organic loads, grease and oils from the intensified agriculture, residential and industrial activities in the Delta region.

Since its establishment as a strong research and development component that would support the MWRI to advance and expedite the implementation of the national water

policy, the National Water Research Center (NWRC) produced a significant mass of research in the different branches of water sciences. It spared no effort to disseminate its research findings and results as widely as possible through direct contacts with the research end-users and stakeholders in addition to the international outreach through conferences, workshops and scientific journals. Although the NWRC carried out all of its research in direct support of the development and management of Egypt's water resources system, there are claims of a gap between research and practice. Generally, these claims are not substantiated either by specific examples or thorough analysis of the research uptake process. Therefore, there is a need to examine this typical research-practice gap cliché against consistent analysis framework. The application of referenced analysis framework to specific research programmes will help to dissect the rich experience of Egypt in water research field and its uptake. Revealing strengths and weaknesses in the research uptake process as well as dissemination of the analysis results will contribute to the enhancement of water research uptake process in other countries similar to Egypt.

By structuring NWRC, so that, each of its institutes corresponds to one or more of the Ministry's major departments, authorities or sectors have ensured research influence on policy formulation and action implementation. Such a unique set up has ensured that research influences water policies and actions on the ground. The impact of research has not only accelerated the implementation of the national water policy, but it also contributed in considerable savings to the national economy, increase in food production and public security.

Research knowledge is one of many competing factors influencing policy decisions that can eventually translate into changes in field practices. While better use of research-based evidence in development policy has been covered comprehensively through different, less has been done to close the gap between research and practice or in determining the impact of the research uptake process on end-users or other stakeholders; this study aims to reduce that gap.

With the objective to identify significant research programs and projects carried out by the NWRC during the last three decades that impacted the national water policies and the irrigated agricultural practices in Egypt, the study documents successful cases of direct and indirect research uptake as well as unsuccessful cases. The effectiveness of the NWRC and MWRI's unique set up and relationship, and its impact on the development and implementation of the national policies is analyzed. Reasons for success and failure are identified in terms of intrinsic and externalities. Specific recommendations for increasing the research uptake and improving the process of wide dissemination of research results, especially in countries with similar condition, and for taking corrective measures to enhance and encourage research uptake to irrigation and drainage practices are highlighted.

The development of the logical framework adopted in the study has largely benefited from the inventory of case studies, documents and acquisition of reports as well as the early interviews with stakeholders. The adopted methodology started with the identification of a reasonable number of research projects that qualify for analysis. This step was followed by information collection that had two pillars: acquisition of reports on selected research projects, and consultation with research stakeholders and donors. The third step was

basically scripting of the collected information that has bearing on the next step; namely analysis. It included scripting of interviews synthesis, and synopses of case studies.

The process of peer selection of case studies has ended up with seven topics that were considered. These are: Subsurface Drainage; Irrigation; Groundwater; River Nile; Water Quality; Grand Hydraulic Structure; and Weed Control. After a thorough revision of the available reports and a rapid analysis of the seven cases selected first and their thematic relevance to the core of the study, it was decided not to include the two cases of the River Nile and Groundwater. The rapid analysis of the River Nile case showed diverse significant research results that did not materialize in a consolidated impact (national programs and well-delineated national policy). Without doubt, research on groundwater contributed significantly in terms of national policy formulation, but within the context of this study it would have, however, been a redundant example of how research impacted the national policy and practice. It has to be mentioned that both eliminated cases had an important impact on the MWRI institutional reform. They also contributed, partially, to the Water Quality case.

The study has successfully identified the current water research strengths and constraints in Egypt and brought up a number of recommendations for improvement and clear vision on how to go forward.

On strengths, the study concluded that the twinning and partnership between NWRC and MWRI departments and authorities created the enabling environment for successful transfer of interactive research output to field implementation. In addition, the fact that the pioneer staff of NWRC originally worked for MWRI departments and sectors provided them with deep understanding of the practices, problems and potential for development and improvement. Furthermore, most committees formed for addressing specific issues or solving an urgent problem within any sector include members of the Center corresponding institutes. This allows institutes to form a research team, carry out necessary research, and present their research findings to the intended sector, discussing and receiving comments, reevaluating their results and findings, and providing recommendations to MWRI sectors.

On constraints, the study brought up some factors that hamper the effectiveness of uptake process; amongst which is the financial shortage and consequently the elimination of some research and extension activities. The undefined communication channels among researchers, their peers working for MWRI sectors and end users are also other constraints hindering the research uptake process; also the weak awareness creation – not allowing uptake to improve, for instance, periodical brochures, flyers, fact sheets on on-going research activities are rarely produced or disseminated amongst MWRI engineers as well as the general public.

In order to improve the uptake of research, the findings of the study suggest the following:

- Users' involvement at an early stage in defining the research agenda may result in goals being often influenced by short-term considerations and/or immediate policy needs. As interactive research is responsive to users' needs, it should not limit applied research from being predictive and visionary.

- Both quality of research and dissemination of results should be emphasized to encourage research uptake. The research quality is addressed because sound research results lead to better and wider uptake. Therefore, NWRC should strengthen and develop a network of strategic partners and alliances from research institutes and universities (national and international), as well as international water organizations.

- No doubt contract research guarantees full research uptake and generates more funds than interactive research. However, there is a high risk of neutrality being compromised or falling into the consultation trap. Contract research has to be encouraged as additional fund generator.

- The political and institutional context and relationships between different actors are central to the uptake of research. When international donor agencies are sensitive to the national needs and priorities, research results effectively impact decision-making and action.

- Donors need to re-engage and support interactive research, not necessarily through pure research projects. Most of the current national projects supported by donors and lenders do not fit under typical engineering paradigm and require more than consultation. A research and development component, in each project, is an ideal point to engage donors in research activities once again. Furthermore, donors' support to capacity building of research institutes may be sufficient to improve research quality but not sufficient to enhance its uptake. However, capacity building of research users and recipients of its results create the enabling environment of improved research uptake process.

- A comprehensive database for all NWRC research projects, findings and recommendations needs to be established. Such database should be accessible by all NWRC and MWRI staff for their benefit and education.

Finally, the study proposes the way forward taking into account the experience of the NWRC as a unique water research institution in the MENA region to be put as an example for other countries. Similar experiences in Syria (Irrigation Modernization) and Yemen (Irrigation Improvement Project) are qualified for analysis according to the framework suggested in this study.

It calls for making efforts to bring the focus on the core elements of the study and disseminate its outcomes to a number of selected developing countries; promoting effective mechanisms that facilitate the research uptake process, and for formulating a regional dissemination strategy as a follow up of this study with the objectives to regenerate increased interest in the water research industry, enhance its uptake process, and ultimately achieve sustainable use of the regions' limited water resources. The newly-born Arab Water Council (AWC) looks like a good candidate to carry out the dissemination strategy.