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WOMEN'S ROLE IN WATER MANAGEMENT IN THE EGYPTIAN SOCIETY

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ABSTRACT – Water is a finite and vulnerable resource that is essential to sustain life, development and environment. Like many countries within the Mediterranean region, Egypt is characterized by arid climate with rapid population growth and escalating living standards. The water resources system of Egypt is depicted by its dynamic and uncertain nature. It is a large system composed of many interacting components and interfaces with social, economic and environmental systems. The population growth and rising living standards have put more stress on both land and water resources. It is worth mentioning that agriculture is considered as the main economic sector and it is the core of most future developments. It contributes to one fifth of the gross domestic income and consumes over 85% of the total water supply. There exists a strong need to save water and allocate it efficiently among various users ensuring the satisfaction of social and economic requirements and the conservation of the environment.

The water administration and water sector decision process have to accommodate now an increasing role of users' organizations and non-governmental agencies, as well as to identify the ways in which information technologies can be gainfully utilized in resolving water problems. The Ministry of Water Resources and Irrigation (MWRI) has adopted new strategies involving private user groups in irrigation management. The focus of these new strategies on decentralization and participation implies accommodation of local conditions and priorities of users. Thus, greater user involvement and influence over the planning and design of services as well as the allocation and distribution of water is attained.

The role of women in planning and operation of water resources systems has been recognized all over the world. There are various levels and actions where women can have a significant effect on the development and management of the water resources systems. The Government of Egypt (GoE) is currently addressing greater involvement of women in different aspects of the water resources allocation, distribution, operation and maintenance.

This paper presents the Ministry of Water Resources and Irrigation (MWRI) efforts in empowering women and activating their role in water resources management. The paper also presents the results of some ongoing projects and activities for enhancing participation of women at different levels in water resources decisions. It also demonstrates the involvement of women in rural areas in water users associations responsible for the operation and maintenance of different parts of the irrigation network.

1. INTRODUCTION

Water is a finite and vulnerable resource that is essential to all forms of life on earth. Worldwide water is becoming an increasingly scarce resource. In past times, at least in non-desert areas, water availability was not questioned. Water was easily available from surface and groundwater sources and ready to be applied in multiple uses (Attia, 1997). With the increasing population on one hand and environmental degradation on the other, pressure has been intensified on the available water resources (Attia, 2001). Tsakiris and Todorovic (1997) reported that the scarcity of water resources, the unfavorable distribution of water resources in time and space, the increasing demands for water, the pollution of water resources, the variability and instability of climate, and the change of socio-economic activities had necessitated the search for rational ways of effective planning and management of water resources. Water institutions, formal as well as informal, water laws, water

policy, and water administration are under going remarkable changes worldwide (Saleth and Dinar, 1999).

A challenge of “governing water wisely” was brought up by the World Water Vision to ensure good governance, so that the involvement of the public and the interests of all stockholders are included in the management of water resources. Transparent and flexible national laws are a prerequisite for integrated water resources management policy development. Better coordination and institutional strengthening is highly needed to overcome fragmented responsibilities in the field of integrated water resources management. More involvement of women in water management as important stockholders is also needed.

Egypt's water sector approaches consider social concerns as important factors contributing to economic efficiency and environmental protection. However, there is no special attention given to the need for the participation of women. The formulation of specific policies to support the inclusion of women in planning and decision making processes remains a pre-requisite in order to prevent that gender based interests disappear in the "mainstream" of water management policies. However, the use of gender analysis as a tool for identifying the various interests of target groups, and those of men and women, has not yet become part of the MWRI planning process, hence, there is a latent risk that these potentialities may be lost.

2. EGYPT’S WATER RESOURCES SYSTEM

Egypt’s water resources system is characterized by its complexity and uncertain nature (Tawfik et al., 2001). It is composed of many interacting components and intermingles with social, economic and environmental systems, which are also complex and uncertain.

Rainfall in Egypt is very scarce except in a narrow band along the northern coastal areas, where an insignificant rain-fed agriculture is practiced. Rainfall occurs in winter in the form of scattered showers. The total amount of rainfall does not exceed 1.5 billion cubic meters (bcm) per year. This amount cannot be considered a reliable source of water due to its spatial and temporal variability. Sparse flash floods also occur in the Sinai Peninsula and in Upper Egypt.

The natural and geographical conditions of Egypt are not auspicious in terms of fresh water resources availability. The generative watershed of the Nile, which is the main source of water for the country, is totally located outside Egypt’s international borders. Downstream of Atbara River in Sudan, the Nile has no other tributaries and it continues as a single channel until it penetrates the Sudanese–Egyptian borders. The Nile morphology and the barren desert, that bounds the Nile Valley and Delta, constitute a geographical barrier that prevents the Egyptians from fully utilizing their territories. On the other hand, most of the available groundwater in the desert is non-renewable and associated with a high development cost.

The average annual yield of the river is estimated at 84 bcm at Aswan. This yield is subject to wide seasonal variation. Nevertheless, Egypt’s annual share of the river water is determined by international agreements by 55.5 bcm. The Aswan High Dam (AHD) is the major regulatory facility on the river. It started its operation in 1968 ensuring Egypt’s control over its share of water and guiding its full utilization. Downstream AHD, the Nile water is diverted from the main stream into an intensive network of canals through several types of control structures. These canals provide water mainly for agricultural use.

Groundwater is also an important source of fresh water in Egypt both within the Nile system and in the desert. Groundwater in the Nile aquifer cannot be considered an additional source of water as it get its water from percolation losses from irrigated lands and seepage losses from irrigation canals. Therefore, its yield must not be added to the country’s water resources but rather be considered as a reservoir in the Nile River system with about 7.5 bcm per year of rechargeable live storage. Groundwater also exists in the non-renewable deep aquifers in the Western Desert region and Sinai. This aquifer is mostly deep with the current total abstraction estimated at only 0.5 bcm per year.

Reuse of drainage water in the Nile Delta has been adopted as an official policy since the late seventies. The policy calls for recycling agriculture drainage water by pumping it from main and branch drains and mixing it with fresh water in main and branch canals (Abdel-Dayem, 1997). There has been a decreasing trend in the amounts of water pumped into the sea with a significant increase

in the amounts of drainage water reused recently as the reused quantity amounts to more than 4.5 bcm per year.

In large cities in Egypt, there are few treatment plants for the collected domestic wastewater. Currently, there is a volume of about 1.0 bcm of primary treated wastewater that is being used in irrigation in specific locations outside the Greater Cairo region. It is expected that in the near future this volume of treated wastewater will reach 2.0 bcm.

In addition to the above mentioned non-conventional water resources, desalination has been used in some remote areas to provide domestic water supply for some locations along the Mediterranean and the Red Sea coasts as well as in Sinai Peninsula. However, the capacity of the desalination plants currently operating in Egypt is much less than 1.0 bcm. Currently, desalinated water use is only limited to municipal uses due to its high cost of production. Nevertheless, renewable energy sources are being investigated, as they are considered promising sources for energy for large desalination projects.

3. EGYPT'S WATER REQUIREMENTS

Egypt's water requirements increase with time due to the increase in population and the improvement of living standards as well as the government policy to reclaim new lands and encourage industrialization. The cultivated and cropped areas have increased over the past few years and will continue to increase due to the government policy to add more agricultural lands. The largest consumers of irrigation water are Rice and Sugarcane because they have high water requirements in addition to occupying considerable areas. The average annual crop consumptive use has been estimated to be more than 40.0 bcm. The total diverted water to agriculture from all sources (surface, groundwater, drainage reuse, and sewage reuse) that includes conveyance, distribution, and application losses is estimated to be about 61.0 bcm per year.

Egypt's irrigation delivery system consists of 31,000 km of public canals, 16,700 km of private mesqas (irrigation ditches) and farm drains, 560 large pump stations, and more than 22,000 water control structures (Saad and Farid, 1996). In such a closed water system of conjunctive resources, improving the use efficiency in part of the system is expected to improve the overall efficiency as it changes the amount of water available for all users.

Annual evaporation from open water surfaces is estimated to be about 3.0 bcm per year using the total water surface area of the river Nile inside Egypt and the irrigation network (canals and drains) and an average annual rate of evaporation. This amount varies slightly from one year to another according to climatic conditions (temperature, humidity, wind speed and solar radiation) as well as the rate of infection of canals and drains with aquatic weeds.

Municipal and domestic water demand including water supply for major urban and rural villages is estimated as 4.6 bcm per year. A part of that water comes from the Nile system and the other part comes from groundwater sources. A small portion of the diverted water (about 1 bcm) is actually consumed while the remainder returns back to the system. The major factor affecting the amount of diverted water for municipal use is the efficiency of the delivery networks. The studies showed that the average efficiency is as low as 50%, and even less in some areas. The cost of treating municipal water can be reduced significantly as the efficiency of the distribution network increases.

There is no accurate estimate for the current industrial water requirement especially with the new government policy to encourage private sector participation in industrial investment. The estimated value of the water requirement for the industrial sector is about 7.53 BCM/year. A small portion of that water is consumed through evaporation during industrial processes (only 0.79 bcm) while most of that water returns back to the system in a polluted form.

Although the international community has acknowledged Egypt's efforts in birth control, the population still gained great momentum and will continue to grow. Thus, efficient and effective use of all water resources in Egypt in both time and space requires the formulation and implementation of appropriate water sector policies.

4. WATER RESOURCES POLICIES

The Government of Egypt (GoE), represented by the Ministry of Water Resources and Irrigation (MWRI), is working towards the promotion of comprehensive water resources management measures to secure water for all sectors. MWRI is the main authority in charge of water resources development, allocation and distribution. Current policies of water resources management look at the whole set of technical, institutional, managerial, legal, and operational activities required to plan, develop, operate, and manage the water resources system on both the national and local scales while considering all sectors of economy which depend on water.

Efficient and effective use of all water resources in Egypt both in time and space requires the formulation and implementation of appropriate water sector policies (Attia and Tawfik, 1999). Recently, MWRI has adopted integrated water resources policies focusing on three major aspects: demand management, resources development, and environmental protection. It has shifted its long going policy paradigm of water resources development to water demand management.

It is expected that the future demands definitely will increase for all uses due to the rapid increase in population and the land reclamation and industrialization policies. The rate of increase will vary from one sector to another according to the government national policy and, thus, reallocation of the available water resources will be needed to meet these future demands.

Therefore, MWRI has launched several projects to contribute to the demand management as well as water quality conservation measures including different structural measures such as irrigation structures rehabilitation, improvement of the irrigation system, installation of water level monitoring devices linked to the telemetry system, expansion in the tile drainage system, etc. Water administration and water sector decision process have to accommodate an increasing role of user organizations, non-governmental agencies, and women, environmental and other self-help groups as well as to explore the ways in which emerging water and information technologies can be gainfully utilized.

There are also several non-structural measures that have also been implemented including programs for cost recovery, institutional reforms, laws and legislations, and decentralization and stakeholders' participation through expansion of the Water Users Association (WUAs) for ditches and mesqas, establishment of the water boards on branch canals, as well as promotion of public awareness programs.

Water Users Associations (WUAs) started as a recommendation of a research project; "Egypt's Water Use and management Project (EWUP)" funded by the USAID during the period 1978-1984. They were established in 1984 as one of the measures adopted with Irrigation Improvement Project (IIP), also funded by USAID. The main objectives of the project included encouraging farmers involvement in the application of physical improvements to the water delivery system to ensure more efficient operation and maintenance of hydraulic and irrigation structures. IIP was introduced in three Pilot areas representing the three distinct irrigation regions in Egypt.

5. HISTORY OF USERS INVOLVEMENT IN WATER MANAGEMENT

The Irrigation Improvement Project (IIP) is one of the large-scale projects that advanced the Egyptian irrigation system in the 21st century. It is the aftermath of a long-term field and research experiments during the period 1978-1984. The main goal of the project was to improve the overall system efficiency through a set of technical, economic, environmental and social measures applied at the field level. The project was based on a detailed feasibility study conducted by a multidisciplinary team. Under the policy direction of demand management, the project adopted several structural and non-structural measures to improve the traditional surface irrigation (Abu-Zeid, 1997). IIP comprises improving control structures, using modern methods in land leveling/tillage, on-farm development, and rehabilitation of main and branch canals in addition to most mesqas, promoting equity of water distribution, and attaining a form of cooperation between the irrigation directorate and farmers, by forming WUAs.

WUAs served as an excellent example of the effect of users' involvement and cooperation in the system management. Although all the users here are farmers who belong to the same economic

sector, it is the concept of stakeholders' involvement in decision making during the various stages of planning and implementation, which is emphasized. Moreover, farmers have better chance for resolving conflicts among themselves automatically as they have to share a common resource.

The main functions of WUAs include participation in planning, design, operation, and maintenance of improved mesqas, identification of roles and responsibilities of mesqa heads and setting up rules to resolve conflicts, establishment of linkages for coordination with other agriculture and irrigation concerned agencies as well as with other water users' associations. WUAs also help in the development of financial resources of the association in order to improve operation and maintenance.

Some functions of WUAs as described within IIP can be listed as:

- Participation in planning, design, and construction of improved mesqas.
- Operation, maintenance, and follow-up of the improved mesqas.
- Improvement of water use activities on the mesqa level.
- Development of financial resources in order to improve operation and maintenance.

Irrigation Improvement Sector (IIS) has been established as a new governmental entity within MWRI on a large scale to introduce irrigation improvement activities and measures in the old irrigated areas. Among these activities and measures are is the establishment of WUAs.

The Egyptian Parliament issue Law 213 in 1994, where WUAs were defined as legal private organizations at the mesqa level in the improved irrigation systems, owned and operated by their members for their own benefit in the old lands. The same Law 213 also introduced the Water Users Unions, (WUUs) which are more or less defined in the same way except that these are applicable for the (Old) New Lands. The Bylaws of Law 213 (Decree No 14900 of 1995) details the rights and duties of the WUAs and WUUs.

The success of IIP in forming WUAs forced the parliament to issue a legislation of such associations in which it was defined as private organizations owned and operated by its members (users of the water course) for their own benefit, and work in the field of water use and distribution and all the related organizational activities for the purpose of raising the agricultural productivity (Attia and El-Shamy, 1998).

6. IDENTIFICATION OF WOMEWN'S ROLE IN SOCIETY

A report on "Women for Water" was presented during the Third World Water Forum held in Koyoto, Japan in March 2003. The report concluded specific recommendations on gender and women's participation in Integrated Water Resources Management (IWRM) as follows:

- Gender responsive Budget Initiatives should be introduced in the water sector, to enable governments, donors, multi-lateral agencies and civil society organizations to be accountable to their commitment to gender equity, poverty eradication, sustainable development and rights-based governance.
- An inter-ministerial dialogue on gender should be established and incorporated into existing ministerial networks, and be supported by regular contact between public sector and civil society in order to ensure ongoing exchange on the progress made on gender mainstreaming in Integrated Water Resources Management.
- Women's organizations should form a Global Women's Water Watch enhancing the implementation of the Women's Water Agenda. Such a platform would provide Governments with valuable feedback on the impact of globalization as well as national and local water policies on gender equality goals.
- Qualitative indicators are needed to monitor the impact of gender mainstreaming and empowerment of women on sustainable development.

Women's access to and control of land and water resources in every society is important. The reasons are not only because women work long and hard hours in agriculture in many countries around the world, but also, because the burden of poverty falls disproportionately on landless population and on women in particular. Egypt is no different than most African and Asian countries. Until recently there was very little, if any, information available on the women role in water management and irrigation. The general belief in Egypt is that irrigation is a man's job. Women's experience with water was perceived as being limited to household usage.

6.1. Participation of Women in Irrigation and Agricultural Activities

Unlike technical, economic and to a certain extent, environmental aspects, the social and gender dimension is much less incorporated into the process of transferring management responsibilities to private stakeholders. Yet, there is a growing awareness among projects and high ranking decision makers to incorporate gender perspectives in the planning and implementation process in order to enhance sustainability. Mainstreaming gender implies that in the process of policy formulation it takes conscious efforts to create an understanding of the particular roles of men and women in order to make effective use of their specific knowledge and potential to participate and contribute to policy objectives.

In the pursuit of mainstreaming gender, it is therefore necessary to take into account the factors hampering women's participation in decision-making, agricultural production and farm management. Even where women are represented in user groups, it may be difficult for them to articulate their interests. Impediments to their participation comprise many factors.

As in other countries of the developing world, many Arab women are actively employed in local farms and agriculture and other domestic productive activities. Whilst their numbers are significant, they do not appear in the labor statistics. Islam also advocated the preservation of the health of women and children through promoting a sort of a family planning based on allowing ample time between pregnancies in order for the health of the mother and child to recover. In the Holy Koran, as well as in all its teachings, Islam has advocated that women be treated with the same respect as men. As the Prophet Mohammed said women are full sisters of men.

In Egypt the National Council for Women was established in February 2000 by a Presidential Decree with the mission of promoting the advancement of the Egyptian woman and enhancing her social, economic and political status. The National Council concerns to developing the women for playing their social and economic role and to integrate their efforts in comprehensive development programs.

6.2. Establishment of a Gender Unit in the MWRI

The MWRI recognized the importance of involving women in water management at the field level, since 1997 the MWRI has coordinated the mainstreaming of gender in the policy framework and its programs through cooperation with the Royal Netherlands Embassy through the Advisory Panel Project. The Panel member stressed the need for elaborating a gender mainstreaming policy and strategies to serve as an orientation for the MWRI and its projects.

The unit was established in November 2001 under the organization of the Irrigation Advisory Service (IAS) of the MWRI. Its main achievements up to date are:

- create a contact and coordinate with other departments and projects in the MWRI to raise awareness about the Gender Unit in order to share experiences and disseminate information on gender issues.
- formulation and execution of a plan of action with the objective to mainstream the gender concept throughout the MWRI activities.
- conduct meetings with the IAS staff (of Upper and Lower Egypt) and projects in the MWRI with the objective to advocate the Gender Unit in the ministry and to improve access stakeholder needs by the unit which is incorporated in its plan of action

6.3. NAWQAM Gender Analysis

The National Water Research Center (NWRC) is also interested in advocating women participation in water management issues. Through the National Water Quality and Availability Management (NAWQAM) project, funded by CIDA, under the umbrella of NWRC, an institutional analysis was carried out on the four components of the project to examine whether gender issues were incorporated and whether the staff understood and were willing to mainstream gender and finally is recommend the possible actions to strengthen gender equality in the future within the project.

Three gender analysis training workshops are carried out with component staff and six flyers on gender issues printed and distributed. Several papers prepared on mainstreaming gender within NAWQAM and are concerning with women's role in water conservation and environmental education.

Three in-depth gender training workshops are carried out and one workshop on conducting field research is held for component staff.

7. CASE STUDY

Three villages in Sharkia governorates have been selected for case studies. The three villages are Tarek Ibn Ziad, El-Rowad, and El-Eman. Data was collected concerning women participation in various activities. In addition, four focus groups have been conducted, two in El Rowad area and another two in Tarek Ibn Ziad areas, 20 women attended in Tarek Ibn Ziad and 25 in El Rowad. The focus group discussions revolved around the following areas:

- Availability, access, use and cleanliness of water.
- Availability and access to basic services such as health
- The impact of this project that could lead to women's development
- Question related to production
- Women's roles in reclaiming land, division of labor, women's perception of their role, decision making powers by gender
- Roles related to human waste
- Knowledge about the project and its activities

Table (1) shows landholdings of both men and women in the three pilot areas in both the baseline and monitoring studies. The table shows that the highest percent of female landholders was in El-Rowad village, while landholders in El-Eman were all males.

Table 1. Gender of Landholders El Husseinia Plain-Estern Delta

Pilot areas	Parameters measured	Baseline Study	Monitoring Study
Tarek Ibn Ziad	Male	97.1%	96.7%
	Female	2.9%	3.3%
El Rowad	Male	76.3%	82.1%
	Female	29.7%	17.9%
El Eman	Male	100%	100%
	Female	0%	0%
Total	Male	84.5%	83.5%
	Female	15.5%	11.5%

Table 2 and Table 3 show women's contribution and involvement in Household and in agricultural activities either by giving advice to their husbands or by buying household needs. In El-Eman village, 100% of the farmers receive advice from spouse; some get the advice on the choice of the crops to cultivate, some get it on the choice of farm machinery, and some get it on procedures of marketing of products. The least involvement of women is exhibited in Tarek Ibn Ziad village.

Table 2. Women's contribution to agricultural and village Work (Baseline)

Land Holder Statements	Parameters measured	Percentage of landholders in each pilot area			Total
		Tarek Ibn Ziad	El Rowad	El Eman	
Landholders takes advice from spouse	Farm advice taken	45.7	49.2	100.0	49.0
Topics on farm holder takes farm advice from spouse	Crops to Cultivate	68.8	58.3	33.3	60.5
	Machinery choices	12.5	3.4	33.3	8.3
	Marketing	6.2	6.9	33.4	8.3
	All farm topics	12.5	31.1	0	22.9
Responsibility for buying Household necessities	Husband	54.3	11.9	50.0	28.0
	Wife	28.6	66.1	0	51.0
	Husband and Wife	14.3	20.3	50.0	19.0

Table 3. Spouses' advice and involvement in farm and household decisions

Landholder Opinions and Perceptions	Parameters measured	Percentage of landholders in each pilot area			Total
		Tarek Ibn Ziad	El Rowad	El Eman	
Women's Overall Agricultural Work	0% share of Farm Work	54.3	28.8	0	37.0
	1-49%	0	13.6	33.3	9.0
	50%	42.9	44.1	33.3	43.0
	>50%	2.9	13.6	33.4	10.0
Women's Village Work	Manufacturing & Crafts	71.4	76.3	0	75.0
Percentage of Landholders with women who share farm work					
Agricultural Tasks Performed by Women	Transplanting Seeds	12.5	9.5	33.3	11.5
	Weeding	0	23.8	33.3	18.0
	Both of the above	81.2	66.1	0	67.2
	Harvesting	6.3	0	33.4	3.3

Table 4 and Table 5 show the previous parameters measured during the monitoring phase for women's involvement in agricultural and household activities.

Table 4. Women's contribution to agricultural and village work during the monitoring phase

Land holder Options and perceptions	Parameters measured	No. of landholders in Pilot area			Total
		Tarek Ibn Ziad	El Rowad	El Eman	
Women's overall share of agricultural work	0% share of Farm work	32.1	5.4	0	14
	1-49%	7.1	42.9	0	30
	50%	53.6	48.2	100	51
	>50%	7.1	3.6	0	5
Women's village work	Manufacturing & crafts	46.4	3.6	0	17
Percentage of land holders with women who share farm work					
Agricultural tasks performed by women	Transplanting Seedings	7.1	5.4	0	6
	Weeding	17.9	57.1	0	43
	Both of the above	32.1	32.1	0	31
	Nothing	32.1	5.4	100	16
	Harvesting	10.7	0	0	3

Table 5. Percentage of landholder's responsibility for buying household necessities

Parameters Measured	Pilot Areas			Total
	Tarek Ibn Ziad	El-Rowad	El-man	
Husband	39.3%	18.6%	0.0%	28.0%
Wife	14.3%	3.6%	0.0%	7.0%
Husband & Wife	46.4%	76.8%	100.0%	67.0%

8. CONCLUSIONS AND RECOMMENDATIONS

There is no clear understanding of gender mainstreaming and therefore, although there are good intentions there are no mechanisms to do that. There is a lack of know how and of understanding of what gender mainstreaming and gender integration really means. The impact or effects of gender blindness is neither felt nor clear to most parties involved in the project also, the result of ignoring or

neglecting gender concerns, is not clearly understood. Although there was a high percentage of female engineers who had above than university degrees, there was a belief that women prefer office work and that they do not and cannot go to the field. It should be noted that percentage of males still higher than females. Most of the staff does not see the problem although they acknowledged the importance of mainstreaming gender.

The case study showed that there are differences in the perception of women's role in assisting in agricultural activities. Some farmers accept women's advice concerning crops to cultivate or market issues, however, most of them prefer that women take care only of the household activities. Some of the farmers allow their spouse to buy household needs; however the majority does not approve that. Nevertheless, because of the time consumed by the male farmers in the fields, spouses have to go and buy their needs. The gender needs assessment shows that female water users want to be involved in the planning of the mesqa improvements in their villages. Their concerns about proper drainage of the residential area, safety around the canals, and the prevention of water and noise pollution, justify their involvement. In none of the water users association's women have been elected as leaders.

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