



Australian Government
Australian Centre for
International Agricultural Research



Brief Retrospective on Water User Organizations in Egypt

François Molle and Edwin Rap

Working Paper (draft)

2013



Australian Government

**Australian Centre for
International Agricultural Research**





1	Introduction.....	4
2	Chronology	5
3	IIP’s promises and constraints	9
3.1	Expected benefits.....	10
3.2	Problems faced	11
3.2.1	Overall project support.....	11
3.2.2	Cost Escalation.....	11
3.2.3	Introduction of Continuous Flow Operations.....	12
3.2.4	Construction Quality	12
3.2.5	Maintenance and sustainability	12
3.2.6	Organizational and collective action problems	12
4	BCWA and districts: what benefits and roles for farmers.....	13
5	Perspectives from different stakeholders	16
5.1	Acceptance or reluctance: farmers.....	16
5.2	Acceptance or reluctance: The Ministry of Water Resources and Irrigation	18
5.2.1	Rolling back the state	18
5.2.2	Lack of motivation	19
5.2.3	Two schools of thoughts	20
5.2.4	Limited partnership with farmers	21
5.3	Donors’ enthusiasm	21
6	Conclusions	22

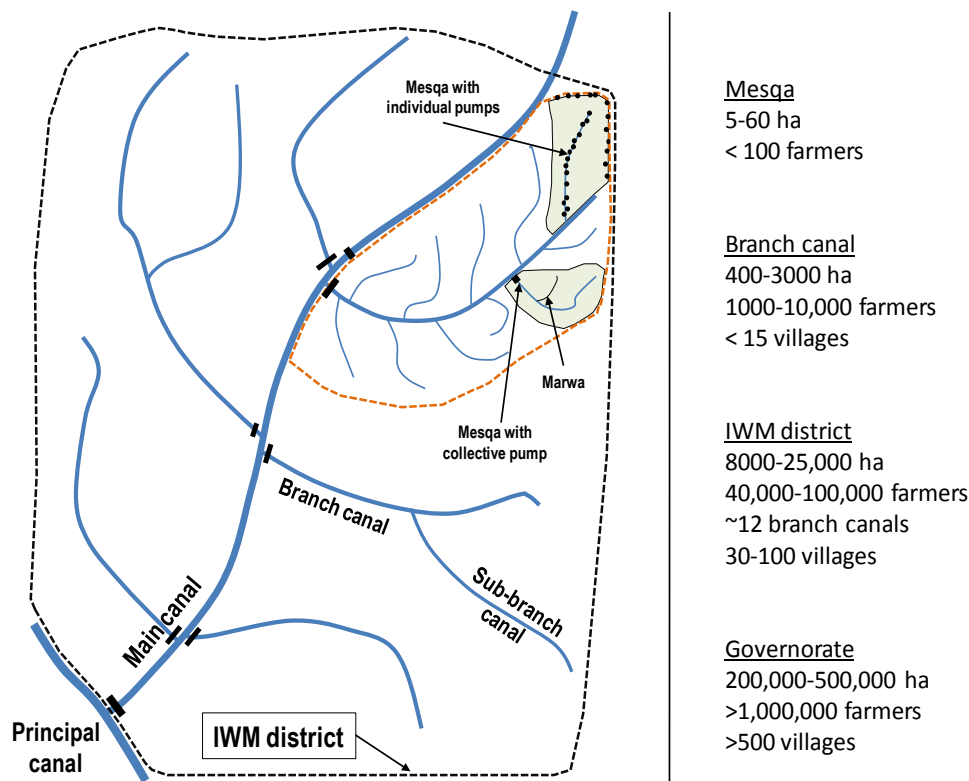


1 Introduction

Egypt has a rich experience with the development of Water User Associations (WUAs) in the field of agriculture. This includes a diversity of geographical situations (groups around tubewells in the oases, large scale irrigation schemes in the valley, the delta, or the new lands), types of water management (collective pumps for 4 to 8 farmers in the new lands, or at the tertiary canal level in the old lands), and different scales (from the tertiary (mesqa), and the secondary (branch-canal) to the district level (around 10 branch canals)).

In the past 25 years, many projects have dealt with organizing farmers, improving the interface/coordination between farmers and irrigation managers, or developing district levels ‘water boards’ to ensure the participation of all concerned stakeholders. It is therefore very instructive to take stock of this rich experience and draw some lessons for the future. A full-fledged analysis of the numerous initiatives and projects would however be a huge task and this section limits itself to providing a summary chronology (section 2) before addressing the difficulties that have been faced (section 3) and the attitudes from farmers, managers, and donors (section 5). In section 4 we review the key relationship between Integrated Districts and BCWUAs. Because of its importance the Irrigation Improvement Project (IIP) is given some more in depth consideration.

Figure 1. Management levels in Egyptian irrigation (delta)





2 Chronology

Some early attention to the potential benefits of better organizing farmers can be traced back to the seven-year Egypt - Water Use and Management Project (EWUP, 1977-84), an interdisciplinary project implemented by the MWRI and researchers from Colorado State University. The project recommended that farmers' participation should be sought in the field of both irrigation distribution (scheduling, rotations, improved delivery, etc) and maintenance, protection, and upgrading of physical works (current repairs, mesqa improvements, renovations of branch canals). This called for the establishment of a special well-trained cadre of professionals (Irrigation Advisory Service: IAS) for defining new responsibilities for farmers and train them to acquire corresponding skills.

Other recommendations concerned the benefits that could be expected from disseminating collective pumps serving canal (or later piped) delivery networks at the tertiary (*mesqa*) level as a substitute for a situation characterized by diffuse individual pumping from multiple points (canals and drains). This led to the Irrigation Improvement Project, launched in 1987, which has since then acquired sector status within the MWRI and been supported by several donors and international lenders (see more details on IIP and its successors projects later). A direct consequence of the technical options proposed and implemented was to make the establishment of mesqa level Water Users Associations (WUAs) necessary. Collective pumps meant that collective action is needed for operating and maintaining the pump, organize water distribution, and pay for energy costs.

Initially, WUAs at the tertiary (*mesqa*) level had no legal status, which among other things constrained their ability to levy money and act as independent bodies with full private ownership of the mesqa level infrastructures. This changed in 1994 with the modification of the 1984 Law 12, wherein WUAs were defined as legal organisations at the mesqa level in the improved irrigation systems (IIP) in the old lands, while similarly Water Users Unions (WUUs) were made legal entities for the New Lands. The Bylaws of Law 213/1994 (Decree No 14900 of 1995) detailed the rights and duties of the WUAs and WUUs, legalizing private WUAs at the mesqa-level and recovery of capital costs of improved irrigation facilities (INECO, 2009).

In 1995 the Dutch-funded Fayoum Water Management Project (FWMP) established the first Water Users Organisations at the Branch Canal or Secondary Canal level called a "Local Water Board" (Abdel-Aziz, 2003). These local Water Boards were responsible for the operation and maintenance of irrigation intake structures of all mesqas, possible saquias (water wheels), and secondary drainage infrastructures in their command areas, weed control, as well as for domestic water use based on canal and drains. Small infrastructure works were funded by the project where needed. Below this level, infrastructures such as mesqas, individual saquias, marwas or field drains remained fully under the purview of individual farmers and are not the responsibility of the Water Board. Membership of the Water Board



was made obligatory for all users of water drawn from irrigation and drainage, be they farmers, residents or industries.

Based on the experience of the FWMP, between 1994 and 2009, another project (The Fayoum Water User Organizations project, in two phases) was set up with Dutch support (Abdelgawad et al, 2010; RTB, 2010). It first focused on developing Water Boards in two administrative districts (*markaz*) in the Fayoum governorate, and then expanded to cover the remaining 7 districts in the governorate. Two models were tested, one with only users representatives, another with both user and government membership. Water Boards were meant to be small “water parliaments” which would congregate stakeholders from the civil society. The project was expanded to other regions and 900 Water Boards have been eventually set up in the Delta, Fayoum, Middle and Upper Egypt.

Under the Agricultural Policy Reform Program (APRP) of USAID (1996-2003), a strong support to different kinds of decentralisation and Irrigation Management Transfer translated in several policy initiatives and changes. The Ministry of Water Resources and Irrigation (MWRI) promulgated a policy allowing for the formation of secondary-level Branch Canal Water User Associations (BCWUAs) and also for the development of integrated districts.

Nine initial Branch Canal Water User Associations have been formed in the Nile Basin by Ministerial decree (IRG, 2002b). Four of these BCWUAs were formed in 1999 as a part of the APRP programme (Kemri, Diarbanigm and Balakter in the delta and one village in Upper Egypt), another four were part of the Irrigation Management Transfer activities of APRP/USAID in the pilot areas of Salhia, Dakahlia, Behaira and Qena. A last one was formed in free-flowing deep groundwater area, under the title of a Water Users Federation or Water User Union [WUU]).

Setting up BCWUAs involved several steps, including obtaining legal authority (by ministerial decree), developing the association by building local management skills, including financial accounting, establishing an agreement between the MWRI and the BCWUAs regarding the activities that each would perform, rehabilitate the system to a mutually agreed level, and finally, transferring the local management and maintenance of canals and drains to the BCWUAs (IRG, 2002b). “*The process to establish BCWUAs was to divide the canal into three reaches with a designated influential farmer for each reach who will nominate representatives for the executive council. The council may delegate the irrigation engineer as a member of the council. The council is responsible for all operational and managerial issues of the canal*” (Abdelgawad et al, 2010: 755). The involvement of stakeholders in management decisions (public participation) was expected to help establish “mutual confidence between the MWRI District engineering staff and the farmers with respect to the ability to manage tasks on the branch canals to the benefit of both. Without this confidence, privatization will be a much slower process” (IRG, 2002b).



Branch canal level experiments were constrained by several factors. The absence of a legal status for user organisations at levels above the mesqa level boundaries made it difficult to develop the financial dimensions of decentralisation; the “Revision of Law 12/1984 on Irrigation and Drainage”, that was to recognise BCWUAs Water Boards as user organisations for water management at the secondary canal level and above made it to parliament but up to these days has failed to be passed (pilot BCWUAs were established under *ad hoc* ministerial decree). Likewise the policy of transferring the responsibility to maintain assets such as canals or headworks made it necessary to rehabilitate these infrastructures before turning them to users, and this required the capacity/willingness of the government to make the corresponding outlays available (which, later, proved to be problematic).

According to USAID “The incentives for the GOE and farmers to undertake this initiative, therefore, are clear and compelling. MWRI, through this IMT policy initiative, has set in motion a long-term evolutionary process, which will allow the GOE to significantly reduce its costs while continuing to expand its coverage and services in other areas” (IRG, 2001a). This statement evidences the strong motivation to cut government costs behind the IMT policy, as well as –perhaps– a degree of self-persuasion. Intensive training activities and study tours to countries such as Mexico, Turkey, Jordan or the US were organized to raise awareness of the purported merits of IMT.

In parallel, the GOE (MWRI) “adopted a policy to integrate all water management functions at the district level to support decentralized management” (IRG, 2002b) and designated two pilot districts. The definition of an Integrated Water Management District (IWMD) was given as “an entity that has sufficient manpower, material, and fiscal resources to operate and maintain all water resources under its jurisdiction. All of the divisions support the water distribution process to ensure that water is delivered equitably, resulting in the various district water entities currently being merged to constitute a single entity referred to as an IWMD”. Concretely the goal was to merge the different existing districts (Irrigation, drainage, mechanical), all defined with different boundaries and neither of them corresponding to administrative districts, into one integrated district, thus 1) reducing the number of staff and putting all of them under the authority of one district engineer, 2) getting rid of the intermediate layer of the Inspectorate, 3) integrating the different functions of water management for coordinated planning and management. The two pilot IWMD of Zifta and Ibrahimia, in the delta, were recognized in 2001 by Ministerial Decree No. 506 and further development led to covering 27 districts in 2007.

A number of issues and constraints facing the implementation of the IWMD were identified, including (IRG, 2002a): 1) the way to define the new boundaries (often taken as those of the irrigation district), 2) identification and selection of the IWMD officers (with conflict between the three departments on who would head the IWMD), 3) IWMD budget allocation and operation mechanisms (with budget coming from different departments), 4) lack of water monitoring programs (needed for improved management but requiring funding for



equipment), 5) lack of public awareness and communication programs, 6) the difficulty to come up with an integrated operational program at the local level, 7) the reluctance to delegate authority and decision-making from general directorate level to the IWMD level, 8) the limited cooperation of the Drainage and Mechanical equipment sectors (which maintained or shifted their best equipment and staff at the levels above the district).

The USAID-funded LIFE-IWRM Project (phase 1: 2004-2008) has, over four years, provided technical assistance to the MWRI to implement decentralized and participatory IWRM over an area of 485,000 ha (15% of Egypt's irrigated area) (El Atfy et al., 2007; IRG, 2008). Achievements include: Establishment of 27 IWMDs integrating all MWRI District-level functions into a single water management entity, formation of 600 BCWUAs covering all branch canals in the target Directorates and involving over 500,000 users; and capacity-building and introducing procedures for systematic data collection and analysis to support measurement-based decentralized water management. The participation of all BCWUAs in the management system of the IWMDs was found to positively influence the quality and the equity of water distribution among in the IWMDs (El Atfy et al., 2007).

This work has been furthered by the second phase of the LIFE-IWRM Project (Phase II: 2009-2012), which has been instrumental in mainstreaming and expanding IWMDs to cover 27 districts in 5 Irrigation Directorates (New Zifta, West Sharkiya, West Qena, East Qena, and Aswan) and to form 600 BCWUAs. The second phase of the LIFE-IWRM component (IWRM II), carried out during the period of January 2009–30 September 2012, is under way was expected to cover 45 districts in 8 Irrigation Directorates, with about 1000 BCWUAs to be formed (Barakat, 2009). Stated achievements are: Formation of 622 BCWUAs (2 million feddan and 1,3 million users, trained BCWUAs to effectively participate in decision-making, support to BCWUA participatory water management activities to assist IWMD staff. In addition, eight Integrated Directorates and 45 Integrated Districts were established, trained and supplied with an Information Management System (IMS).

BCWUAs should participate in the annual planning, prioritization, and selection of maintenance and minor works, with one or more inspection of the branch canals and the drainage systems to be carried out jointly with the IWMD engineers and technicians. Likewise, MWRI should inform/consult/involve BCWUAs when design starts and tender documents are prepared, about the award of contracts, and involve them in the monitoring of progress and quality control during the execution of maintenance or minor works (Barakat, 2009). BCWUAs are also expected to monitor, measure, and record the water levels at the head of branch canals and key control points, as well as in secondary drains, to detect and report anomalies and shortages. They should review and discuss the recorded water levels on the branch canals with the IWMD staff. Common understanding of the area's main problems and priorities is to be built through Branch Canal Needs Assessment, a diagnostic device to be carried out whenever needed (every 3 years, for example).



The two parallel initiatives (LIFE II and Water Boards) consisting in establishing IWMD districts on new district boundaries designed to better integrate the irrigation, drainage and mechanical departments, and Water Boards at the (administrative) district level (*markaz*), need – at some point – to be harmonized. The IWMDs are predominantly state units although participation of BCWUAs is intended to be substantial, while Water Boards are meant to directly represent users and stakeholders interests and collaborate with officials. Although IWMDs and *marakiz*¹ boundaries do not correspond, efforts have been made to make use of the district Water Boards to jointly manage the water resources with district staff by getting “involved in setting priorities, undertaking operational and maintenance works, in addition to water quality improvement activities” (APP, 2007).

Earlier assessments of participatory water management (APP, 2007) have revealed worrying trends. Barakat concluded that (i) Participation of WUOs in water management is extremely low, (ii) all actors have a poor understanding of the possibilities to take action, (iii) WUOs and MWRI field staff don't feel partners, (iv) there is a felt need of clear instructions from higher levels. Likewise Bron (APP, 2007), based on the monitoring and evaluation of 150 WUOs during several years, concluded that: “1. The level of participation of water users in water management, also when organized in water users' organizations, is very low. Even the level of being informed after MWRI field staff has taken a decision often is not reached. 2. No water users' organization in Egypt has reached a level of institutional strength that can be considered sustainable. 3. Projects achieve an initial build-up of the institutional strength of WUOs. However, apparently the projects are not successful in reaching a sustainable level of WUOs strength. When the attention for the WUOs decreases after the completion of projects, the WUOs' sustainability level declines”.

In 2006, the Integrated Irrigation Improvement and Management Project (IIIMP) project, funded by the World Bank, KfW and AFD, was launched as a successor project of IIP. This new project introduces some adjustments in the IIP package (electric pumps rather than diesel, reduced capacity of the pump, cheaper piped distribution lines, improved on-farm/marwa level distribution, etc) and takes a much broader approach than the IIP by also considering the establishment of WUAs, BCWUAs and more widely integrating users participation, decentralization, IWM, institutional reform and system modernization into a "From Mesqa to District" approach (APP, 2007; World Bank, 2005).

3 IIP's promises and constraints

Started in 1984 under USAID's support, turned into a full-fledged programme in 1989, expanded by the World Bank in 1995, and later in 2006 -and up to these days- expanded into the IIIMP programme, the idea of introducing mesqa-level collective pumping stations in the

¹ “The boundaries of MWRI district is usually different than the Markaz where the MWRI district is determined by the hydraulic characteristics of the irrigation and drainage network. Therefore, the MWRI district may overlap with more than one Markaz, and the Markaz may overlap with more than one MWRI district” (IRG, 2001c).



delta is nearing thirty years of history. This intervention has been praised as spearheading the “modernization” of irrigation in Egypt, the IIP being “a state-of-the-art project, especially in terms of the approach followed in involving the end users - the farmers - through Water User Associations (WUAs) in the design, implementation and maintenance of the physical structures and the allocation and distribution of water by WUAs themselves” (Hvidt, 2005); “The IIP is to be seen as the first step to bring the Egyptian irrigation system in line with the functional demands it will be facing by the turn of the 21st century” (Hvidt, 1998). The project has improved 2900 mesqas covering an area of 200,000 feddan (World Bank, 2007).

Because of its iconic status, and because collective pumping stations make it necessary to establish Water User Associations to ensure their operation, physical and financial sustainability, this section dwells further on the IIP experience and its lessons in terms of collective action.

A WUA is defined as “a private organization owned, controlled and operated by member users for their benefits in improving water delivery, water use and other organizational efforts related to water for increasing their production possibilities” (IIP, 1990a; Hvidt, 2005). WUAs access water from the Branch canal in which, following IIP’s design, a continuous supply is to be ensured, instead of the traditional on/off rotation. This is to be achieved by retrofitting regulators and the branch canal profile and using automatic gates that allow more water in when a downstream increased demand manifests itself by a drop in water levels. Continuous flow was the most attractive feature for farmers, who saw the prospect of a continuous supply and the end to water shortages. They saw continuous flow as “important to assure the success of the project” (Metawie, 2002).

3.1 Expected benefits

The IIP package was potentially very attractive and had several expected benefits (Hvidt, 1994; Lowdermilk and Barakat, n. d.):

- The collective pumping stations would do away with the scattered and diffuse individual pumps and achieve economies of scale in terms of energy costs (for both farmers and society).
- Engineers anticipated that continuous flow would put an end to unpredictable supply, which was considered as the main cause of farmers’ “over-pumping” during their ‘on’ turn (seen as a means of storing water in the soil profile to offset possible discontinuities in supply).
- Delivery of water to the marwa or plot level through a network of lined canals or pipes would reduce losses and improve irrigation efficiencies (also limiting overall water abstraction and return flows to drains, where quality is often degraded).
- Equity of water distribution would be improved due to the ease in distributing water and head-end/tail-end inequities would be relieved.



- Positive environmental and health impacts would result from farmers no longer needing to pump polluted and/or saline drain water and mesqa being filled in.
- Filling-in mesqas would increase arable land by 1 to 2%.
- Farmer's irrigation costs (labor, pumping and mesqa maintenance) and drudgery (necessity to move the pump back and forth) would be substantially reduced.
- Increased crop yield, diversification to cash crops (and farmer income) would result from a better and more secure availability of water.

3.2 Problems faced²

It is not the objective here to carry out a thorough assessment of the IIP experience. The evidence available is mainly derived from the Monitoring and Evaluation components (carried out by the Ministry itself) as well as a few occasional local studies. After a brief mention of the difficulties that were faced we examine some of the lessons that can be drawn in terms of collective action.

3.2.1 Overall project support

The rate of implementation has been slower than expected. IIP and IAS (Irrigation Advisory Service) staff were insufficient or overburdened with additional tasks (IRG, 1998a). Both World Bank-funded IIP and USAID IIP projects were hindered by staff turnover and losses of trained personnel, "lack of adequate training, lack of career opportunities and low salaries unattractive to new engineers, lack of support for field staff, and other internal management problems" (IRG, 1998a).

3.2.2 Cost Escalation

During the implementation of the project it became apparent that the cost of IIP works for mesqa rehabilitation was escalating and becoming excessive. This had several causes (WB, 2005), including delays in completing works; the tendency to overdesign pumps and pipelines under the expectation that continuous flow would not happen (with the same amount of water needing to be distributed during the shorter period of 'on' days); higher than expected costs for contractors and tasks like filling up of mesqa, unmet expectations that more private sector participation in contracting would reduce costs.

The IIIMP economic and financial studies have shown that such high costs would threaten the project's economic feasibility and also lessen the financial attractiveness of the package for farmers (WB, 2005). Several cost-cutting technical adaptations were tested in an experimental

² The World Bank's (2007) "IIP Project summary" section on "Challenges Encountered" is summary: "During Implementation pertain to the devaluation of the Egyptian pound which led to failure of some of the contractors, thus affecting the implementation schedule and resulting in delays. The implementing agency had to resort to smaller contracts. Nevertheless, it managed to reach a 90 to 95% completion which is considered a satisfactory achievement given the prevailing conditions at the time of devaluation".



area (called W-10) and integrated into the IIIMP proposal before it started (including a switch to electrical pumps, a change in valves, a reduction of the pump capacity).

3.2.3 Introduction of Continuous Flow Operations

The establishment of continuous flow, “the key and lead technology of IIP” (IRG et al., 1998), has been the main challenge. Many mesqas were equipped with pumps before the interventions on the branch canals (re-profiling of the canal) were completed (or sometimes initiated). As a result continuous flow could not yet be implemented, frustrating farmers for whom this was the most attractive promise (IRG et al., 1998). The lack of branch canal profiling and other technical reasons made it necessary to ensure preferential allocation to IIP canals, which affected the balance with other canals and drew complaints from them (Hvidt, 1998). The recommendation was therefore made that continuous flow should be operationalized in the command area prior to improved mesqas coming on line. The BCWUAs could be formed early on, assist in the works on the branch canals, and then later on help in setting up the WUAs at the mesqa level (IRG et al., 1998).

3.2.4 Construction Quality

Contracting procedures and contractor performance have remained a strong concern up to present. “Contractor non-performance not only caused project delays but seriously undermined farmer confidence in the IIP and its abilities” (IRG, 1998). Non-performance includes poor work execution (canals with faulty slope, leaks in canals or pipes, bad compacting, poor design and too low pressure in pipes, etc), low or no responsiveness to the problems signalled by farmers after construction, etc. The limited monitoring of work and accountability created situations where contractors were rushing to bid for and initiate new works without having finished the on-going ones (in some cases, re-contracting of a new firm has been necessary). Contractors’ performance and reducing implementation delays was reportedly improved through consideration of smaller contract packages (World Bank, 2007). These problems of low quality work are actually observed in all types of interventions (e.g. canal dredging) and seems to either receive insufficient attention from officials or to be very resilient to change.

3.2.5 Maintenance and sustainability

One of the most nagging problems invariably reported by farmers is the difficulty to find spare parts or to find the technical expertise to react to technical problems. This is true for all kind of pumps, including electric ones and associated transformers.

3.2.6 Organizational and collective action problems

In some cases the pump and the distribution network don’t have problems but farmers are unable to organize themselves to establish transparent and equitable rules for distributing



water, to collect money to pay for repairs and sometimes even for current costs (diesel or electricity). The project typically overlooks the costs of collective action and does not anticipate that in some cases there is a lack of social capital or internal conflicts that militate against the establishment of O&M rules.

In sum the degree of success or satisfaction is extremely varied, from very enduring WUAs and satisfied farmers to situations where the pump has been stolen/broken and farmers have reverted to individual pumps. It is apparent that the success of the IIP, and therefore of the WUAs in appropriating this innovation, is strongly associated with both environmental and social variables. Favourable conditions identified in preliminary surveys by IWMI include: short branch canals, abundant supply from parent canals, cohesive communities, pumps with adequate/large pumping capacity.

4 BCWA and districts: what benefits and roles for farmers

The rationale for BCWUAs in irrigated agriculture was said to be based on principles of Participatory Irrigation Management (PIM), whose “generally acknowledged benefits include, but are not limited to, productivity increases, positive changes in cropping intensity, improvement in financial impact performance indicators, resolution of water-related conflicts, and a positive environmental impact” (IRG, 1999a).

But the policy to develop BCWUAs in the late 1990s was very much driven by a desire to reduce state expenditures and enforce “cost-sharing plans” (IRG et al., 1999a). These plans were to define in a negotiated manner (between the BCWUAs and the government) scheduled Operations and Maintenance (O&M) works organized in “O&M pathways” that would be sanctioned by a Memorandum of Understanding (MOU) between the BCWUA and GOE. The BCWUAs would be reimbursed after assessment of the works achieved. They would also be trained by the IAS and later be instrumental in helping establish WUAs when a mesqa improvement package would be applied (IRG et al., 1999a).

Between 1995 and 2005, more than 40 Water Boards have been established in Fayoum by the Dutch-funded Water Board projects (APP, 2007). They were trained to plan and execute (by themselves or through local small contractors) O&M works on a yearly basis, with funding channelled through the Technical Assistance, thus circumventing the legal constraints faced by MWRI to transfer funds to WUA’s (APP, 2007). This temporary solution was supposed to be addressed by the revised law which was to empower WUAs above the mesqa level and give them autonomy. Although the work was supervised by the MWRI, the process was largely driven by the BCWUAs assisted by their own Federation Engineer (district level).

After 10 years (in 2006) the Dutch government decided to channel the funding through MWRI in an attempt to ‘internalise’ the process. The minor maintenance works and the weed control program came under the Ministry and had to comply with its central tender regulations. The planning process is still managed by the WUA’s but the execution is now



managed by the MWRI, although WUAs can still be sub-contracted for some work by the contractors.

Ultimately it was expected that the users would bear the costs of O&M of the part of the system they manage. This would amount to a shift of about 50% of the current government expenditures on O&M to the Water Boards (farmers) or an expenditure of about LE 15/feddan per year (Table 2). The overhead costs for the Water Boards for running their organization are estimated to reach about LE 15/feddan per year (Abdel-Aziz, 2003).

The BCWUAs established in the IWRM 1 project (USAID) have been assessed by means of questionnaires by BCWUAs' boards and by district engineers (Barakat, 2009). They show that communication has improved markedly between managers and farmers. However the activities that involve a degree of transparency and accountability have been the least adhered to: for example the information on the award of maintenance contracts, or the involvement of farmers in the monitoring of progress and quality control of works was found in only 40-50% of the associations. The joint review of recorded water levels on the branch canals also occurred only in 62% of the cases.

In spite of optimistic policy expectations, achieving sustainable local financing for canal and drain maintenance proved to be much more difficult than expected. The 2012 final Project Completion Report of the LIFE-IWRM Project (Phase II: 2009-2012) mentions a few cases in which BCWUA members helped a MWRI by collecting money to share in the cost of maintenance (IRG, 2012). Although this is expected to increase, they appear to be isolated cases. A structural problem remained that local financing plans and cost recovery by BCWUAs required an amendment of Law 12/1984. Several steps were undertaken by the MWRI to draft and submit a new law on Stakeholder Participation, which they considered more appropriate. However, since September 2009, the Egyptian Cabinet did not move forward with this initiative and did not amend Law 12 for unknown reasons and the LIFE Project decided in March 2011 to stop local financing work (IRG, 2012). It is unlikely that without the legal backing, these cost recovery initiatives have developed by themselves since the Egyptian Revolution of 25 January 2011. This is a significant drawback for these policy initiatives directed at user participation, since "true participation is in decision-making and sharing financial and management burdens" (Kotb, 2010).

The second LIFE-IWRM project spent much effort on the formation of IWMDs with a new integrated water management approach and BCWUAs to represent water users from different branch canals in the new IWMDs. BCWUAs were trained to effectively participate in decision-making regarding water management activities. More than half of the farmers in the area were aware of the BCWUA and perceived benefits in terms of better water delivery, better canal maintenance and better information (IRG, 2012). The BCWUAs dealt effectively with maintenance, by developing lists of maintenance priorities along the Branch Canal and submitting them to the IWMD for inclusion in maintenance planning. Also the monitoring of



the maintenance works was carried out by these user organizations. Maintenance clearly received the highest priority of the project training, and canal operation only received attention towards the end, resulting in less improved water management practices and performance. However, the BCWUAs were also functioning to resolve conflict at the local level. An IWMD Manager somehow summarizes a central idea behind the project and states how it has been realized:

“Now I have a trained staff with modern equipment. We can handle O&M of both irrigation and drainage. We have good relations with BCWUAs and many problems are solved by the BCWUAs or my staff before I hear about them.” (IRG, 2012: 13).

Consequently, the Project Completion Report reports the emergence of strong relationships between BCWUAs and IWMDs, based on the strategy of establishing IWMDs first which subsequently establish and support BCWUAs. Clearly, the BCWUA water management activities of the project “were designed to assist IWMD staff” (IRG, 2012: 6). This relates to a concern for their viability formulated as a ‘lesson learned’ by the project:

“BCWUAs must assume increasing levels of responsibility to remain viable and effective; obtaining legal status is a necessary precondition for that to happen.” (IRG, 2012: 26).

The LIFE-IWRM project has faced a set of institutional problems in its second phase that complicated the implementation of Integrated Water Management:

- The MWRI had a special Integrated Water Management Unit that was disbanded in September 2010 when the USAID funding terminated.
- A portion of the MWRI staff believed that IWRM did not have support of the MWRI top and would not be continued after the project. This contrasted with Phase I implementation when Minister Abou Zeid issued written instructions to the field staff for this purpose.
- MWRI postponed the consolidation of the Drainage and Irrigation Directorates into Integrated Water Management Directorates. The transferred drainage equipment was unusable and the staff in the districts was hoping to be transferred back to the Egyptian Public Authority for Drainage Projects (EPADP). This resulted in substandard performance of the IWMD in drainage. The district integration process is thus incomplete and requires full authority of the districts over drainage.
- Accurate supply and demand data are not flowing on time between the Ministry of Agriculture and Land Reform (MALR) and the IWMDs, resulting in inaccurate calculation of crop water requirements, making monitoring of water demand vs. supply difficult. To achieve water conservation, a close working relation between MALR and MWRI at both central and field levels is needed.



Several questions emerge when reviewing the achievements and limitations of these projects:

- What are tangible benefits for water users to remain involved in BC-WUAs or district- level Water Boards when the legal status and transfer of concrete O&M and financial responsibilities are not forthcoming?
- Are the BCWUAs, designed to assist IWMD staff, capable of demanding improved services from the IWMDs, i.e. improve their accountability and transparency?
- How are mesqa-level WUAs represented in the BCWUAs and how are both periodically elected and renewed?
- Why is it especially difficult for drainage to be integrated in the new IWMDs?
- What hampered the renewal of Law 12 concerning integrated water management and water user participation?
- Is the idea of IWRM adopted by the MWRI top as a matter of principle or because donors require this?
- What is the reason that MALR and MWRI have a less than close working relationship?

5 Perspectives from different stakeholders

5.1 Acceptance or reluctance: farmers

Whether farmers show enthusiasm, acceptance, reluctance or rejection of the various top-down initiatives aiming at establishing participatory management and associations is unclear, and highly varies with the context. Reports on workshops organized as part of IIP or similar projects tend to show that farmers supported the reforms and even displayed “an overwhelming positive interest among stakeholders in establishing WUAs in non-IIP areas and apex organizations at the branch canal level; the apex organizations would be instrumental in the effective formation of mesqa-level WUAs in non-IIP areas” (IRG, 1998b). Representatives and members of the Water Boards have also frequently declared and showed that they were ready to work in a voluntary manner because they saw that the Water Board served their interests. They were even “enthusiastic” due to the feelings that they had a say in resource allocation of the Ministry regarding water and maintenance issues (APP, 2003).

But careful reading of reports also explains why this occasional enthusiasm remained guarded or often evaporated. Adhesion to the IIP programmes was closely linked to the promise of continuous flow, in which farmers saw the end of all their water-related problems. Experts observed that “there are indications that users are willing to share in the costs if services are reliable and responsive to demand” (World Bank. 2005). But satisfaction was often registered in the first years, especially because of preferential allocation to IIP branch canals to offset the incapacity to ensure continuous flow.



A similar, seemingly contradictory, situation can be found with regard to maintenance. Better maintenance is appealing to farmers and they are keen to contribute to improving it. However, more than 65% of water users thought the government should continue doing maintenance operations (Moustafa, 2004). To the question whether they would be willing to assume the maintenance costs of works achieved by the government, farmers were not in support of taking over this burden. The support for what maintenance work is proposed normally increases, when WUAs feel empowered and involved in the definition, prioritization or execution of the work.

In such conditions, which are those envisioned by the different projects involved in institutional building, farmers express a willingness to take on the O&M activities on the branch canals (IRG et al.; 2001a). They indicate that trash removal and preventing dumping trash and sewage in the canals would be improved if BCWUAs had the authority to maintain the canals and punish polluters; and that they can do many of the branch canal O&M operations at lower cost than the currently contracted private companies (IRG et al.; 2001a), which are widely criticized for the speedy way in which they expedite their work and the severe problems induced by careless execution (deepening of canals that lowers water levels, dredging of banks in way that induces landslides, removed material deposited on the side and obstructing movement, etc). Often, however, “it was felt that the issues and implications related to cost recovery were not adequately understood by WUA shareholders at the time of implementation” (IRG et al., 1998b), and the degree of involvement announced, as well as purported benefits, did not materialize.

Surveys at the national level showed that a high percentage of farmers express their desire to be included in the decision-making process regarding canal operation and maintenance activities (El-Zanaty & Associates 2001). Willingness to participate in WUAs and to share the cost of upgrading the irrigation and drainage systems in their local area is also high when associated with promises such as continuous flow or improved drainage. The desire for more consultation, discussion, recognition, attention from officials is widespread and also shows a feeling of hopelessness of those located at the very tail end of both water distribution and decision-making systems. For example “nine in ten farmers would like the irrigation engineer to consult with them on matters such as branch canal operation, scheduling cleaning, the rotation, garbage in canals and illegal outtakes” (El-Zanaty & Associates 2001).

Farmers convened in workshop to discuss the role of WUAs indicate “that the opportunity to dialogue with senior ministerial officials on a regular basis would provide a significant psychological boost to support the fledgling WUA organization” (IRG et al., 1998b). Likewise the question of the amendment of Law 12 in order to legally allow for full-fledged and autonomous BCWUAs or district water boards is believed to be key to improving their position to negotiate with MWRI staff and widening their scope and self-reliance in contractual matters, but also to “increasing the WUOs' self-esteem” (APP, 2007).



Relations between farmers and authorities, however, remain unsatisfactory, despite intensive training and awareness raising activities (see next section). “A prevailing weakness in the IIP approach is lack of popular understanding of the working inter-relationships between IIP, IAS, and the WUAs” (IRG et al., 1998b). Batt and Merkley (2009) consider that “the MWRI, together with the international funding agencies, does not pay much attention to exploring farmers’ needs in their area, and they continue to introduce new projects based only on their own point of view of what the irrigation system might be”. Their study in El-Ibrahimia canal area (Skarquia province), showed that almost 100% of the farmers surveyed were not asked about whether they wanted a project in their area or not, that it was all done exclusively by government decision. In the IIP it is apparent that farmers did not understand the use/need of branch canal automatic downstream control gates provided by the project, leading to their being tampered with, disabled or bypassed (World Bank, 2007). Likewise, although on paper farmers at each individual mesqa are free to choose either to accept or reject the IIP improvements (Hvidt, 1998), strong persuasion by different means often left farmers with the perception that they had, in fact, no such choice (as illustrated by the stiff resistance displayed by, and the conflicts surrounding the very few cases where groups of farmers have succeeded in staying out of the project).

Farmers seem to believe that under the plans and changes presented to them by project engineers or experts, the improvement in overall irrigation and drainage conditions offsets the additional costs in terms of financial contribution or transaction costs in building and sustaining organizations over time (IRG et al; 2001a). Yet while official discourse of aid professionals and officials is centred on instilling in farmers a ‘sense of ownership’ it is often the objective of transferring the ‘management burden’ to farmers which dominates (Moustafa, 2004). When empowerment and expected benefits are not forthcoming, participation and collective action are severely dented (Abou-Seida, 2001).

5.2 Acceptance or reluctance: The Ministry of Water Resources and Irrigation

This leads us to turn our attention to the side of the government in general and of the Ministry of Water Resources and Irrigation (MWRI) in particular. While a lot of attention is directed to the analysis of the costs and benefits accruing to farmers and the circumstances under which they might support reforms and contribute to their success, very little work is available on similar questions applied to the other key stakeholder, the MWRI.

5.2.1 Rolling back the state

While most of the IIP programmes were focused on achieving a number of local objectives, for which WUAs are a necessary element, water policies took a much more reformist turn in the late 90s with the USAID-funded Agricultural Policy Reform Program (APRP) programme. The then ubiquitous ideology of ‘rolling-back the state’ translated into policy proposals that moved from conventional participatory approaches to more radical



management transfer programmes. The rationale of these transfers is unambiguously linked to a will to reduce state expenditures and shift part of the O&M burden onto farmers. It is also expected that decentralisation, transfer, and the privatization of some tasks (e.g. some maintenance work being handled and paid for by BCWUAs, but more generally allowing the private sector to take managerial and financial control over operation and maintenance; IRG et al., 2001b) would result in more efficient outcomes in terms of water control.

As made explicit by Dr Abu Zeid, former Minister of Irrigation, “irrigation operation and maintenance always require big efforts and form a large financial burden to the government, and this is true in Egypt with the large Nile irrigation system. Therefore, it is of great desire to transfer the irrigation management responsibility to farmer's organizations for improved and sustainable irrigation service. MWRI took many positive steps in the direction of participation and more efficient involvement of stakeholders in water management” (APP, 2007).

These policies were strongly supported by donors for which Egypt had joined “other governments around the world [which were attempting] to reduce their recurring expenditures on irrigation and stabilize deterioration of scheme infrastructure without sacrificing the productivity of irrigated agriculture” (IRG et al., 2001b). No efforts were spared in trying to convince the rank and files of the Ministry of the desirability and inevitability of the reform. Numerous field trips arranged for politicians and officials to see by themselves IMT and privatization models in other countries, training and lobbying efforts helped to provide the “bureaucratic orientation” required (Aziz, 1995).

5.2.2 Lack of motivation

Unfortunately part of these bureaucratic orientation efforts was lost because of the typical high turnover rates of officials in the Ministry, raising the need for continuous awareness raising (Aziz, 1995), but also generating inefficiency and frustration.

Beyond officials at the central level of the Ministry, the importance of the involvement and behaviour of field staff is paramount. Field staff includes managers from the Ministry at the Directorates and district levels, as well as the gate operators (*bahari*), but also dedicated project staff (e.g. IIP) and the Irrigation Advisory Service (IAS) that was created to spearhead the creation and training of WUOs. It is apparent that field staff has an inadequate sense of ownership and understanding of the improvements (APP, 2007), are subject to frequent rotation and transfers, and have little incentives and even interest in the work they are supposed to perform.

Indeed the lack of field staff’ personal involvement in WUs formation can be explained by several negative incentives “like the absence of rewards, career risks, over-asking WUOs, risk of delays in construction, lack of endorsement by superiors, etc” (APP, 2007). The failed implementation of continuous flow provides a good example of this state of affairs. Beyond technical justifications it is apparent that continuous flow basically dispenses with the need



for *bahari* and reduces the intervention needed by both the local gate keepers and the district engineers. This results not only in a loss of social status, prestige, self-esteem and sense of usefulness, but also of the complementary income that comes with farmers' demands for extra supply and associated bribing (Hvidt, 1998).

Likewise it can be argued that the failure to pass the revision of the Law 12 (which made it up to parliament 10 years ago but has not been ratified) is, in no small proportion, linked to the disincentives to staff at different levels. Empowering BCWUAs might not only make staff redundant (which is actually a stated objective), replace private maintenance contractors by community-based and -controlled operators, but it is likely to come with greater exigencies for accountability and improved water management formulated by a stronger negotiating-power of user organizations. All this is extremely disruptive of the status quo and of the 'management-as-usual' strategy that minimizes work input.

On this basis it is dubious that the solutions usually advanced ("clear instructions from higher levels", "the absence of legal status for WUOs", the "lack of skills or training" or more strangely the fact that "MWRI field level has not been instructed to involve the WUOs in the decision-making" (APP, 2007) can revert a situation described as "the zero-involvement of WUOs at present" (APP, 2007).

5.2.3 *Two schools of thoughts*

There is also evidence that the Ministry's official were somehow confused by the multiplicity of institutional building programmes in Egypt, where WUAs, BCWUA, local water boards, district water boards, integrated districts, Farmers' federations, etc were (and still are) developed in parallel by diverse projects funded by USA, The Netherlands, Germany, Japan, IFAD or the World Bank, without clear policy direction on resolving possible antagonisms or contradictions (Allam, 2004).

Barakat (APP, 2007) aptly describes the division of MWRI staff into two categories regarding the need for institutional reform. The first category includes officials who see institutional building as a part of a wide participatory policy (PIM), whereby the communication between engineers and users is improved, farmers solve some internal conflicts among users, elect representatives to liaise with Ministry staff, collect information on crop calendar, and take care of O&M activities at the tertiary level and below (that are beyond the officials' purview and interest): "they see WUOs as an extension of the MWRI". The second category includes officials with a deeper reform agenda in mind that includes irrigation management transfer (IMT) and therefore reduction in both the prerogatives and the budget/staff of the Ministry, against an empowerment of farmers to be organized at different levels and increasingly in charge of O&M in an autonomous way, with a degree of accountability to be established between managers and users. As Barakat stresses, "both reformers and improvers are not well aware of the perspective of the other group. Because both groups make use of the same



(generally accepted) words and terminology it is quickly assumed that there is agreement, while in reality each group means something completely different when using the terminology”.

5.2.4 *Limited partnership with farmers*

Barakat³ (APP, 2007), while stating that “the participation of WUOs in water management is still extremely low”, stresses that both WUOs and MWRI staff have a poor understanding of the possibilities and the limitations of participatory water management, see one another more as antagonists than as partners, and have not embraced the reform agenda in any significant way.

What can be done to change this situation? To “overcome the continuing reluctance of some MWRI staff to increase the direct involvement of users in water management”, the Ministry will continue to support communication and awareness programs (El Atfi et al., 2007), and provide staff with responsibilities, training, equipment, software and encouragement (El Atfi et al., 2007). While an adequate budget and legal reforms are seen as necessary to achieve PIM/IMT objectives of ensuring the sustainability and replication of WUOs, the analysis of bureaucratic resistance sketched out above raises doubt on whether these will be sufficient.

5.3 Donors’ enthusiasm

Development bank and aid experts have been instrumental in introducing and supporting PIM/IMT based reforms in the water sector. It is therefore not surprising that they use, with some exception, a very positive language to describe what is being achieved, or what could be achieved: “The incentives for the GOE and farmers to undertake the development BCWUA are clear and *compelling*. MWRI, through this IMT policy initiative, has set in motion a *long-term evolutionary process*, which will allow the GOE to significantly reduce its costs while continuing to expand its coverage and services in other areas” (IRG et al.; 2001a). There is little room for doubt or reflection on the contexts in which the policy would be more relevant, or on the possible variations it could follow: “Formation and establishment of water user associations at the branch canal level is *viable, highly desirable* means of advancing farmer participation in irrigation management” (IRG et al.; 1999a).

There is also strong emphasis on the willingness of the Egyptian government to embrace reforms and changes, even though –as shown above- this is not true for all levels or individuals.⁴ For example, the GOE is seen as being “keen to replicate BCWUAs in non-IIP areas, and to take the organizing and supporting of WUAs out of a “project” modality

³ Based on a questionnaire filled by a sample of water managers and users.

⁴ But some of the ministry officials did share/echo donors’ enthusiasm (e.g. “The modernized process, through implementing the full package of the IIP, can be considered as revolutionary changes in the irrigation system in Egypt”, Allam, 2002).



and have it in the mainstream of MPWWR's work" (IRG et al.; 1998b). Effective water user participation in irrigation system improvement, operation, maintenance and management are said to be "a policy objective of the Ministry" (IRG et al., 1998) that is described emphatically:

"The GOE transfer of major management responsibilities for sections of the irrigation system above the mesqa-level to stakeholders and/or the private sector is a *bold advance* toward the goal of participatory management and privatization of the irrigation system. Although irrigation management transfer (IMT) is now a *major feature* of irrigation delivery in many other countries, IMT is only now being launched in Egypt. Successful implementation of this benchmark will be a *major turning point* for this process to take hold at the grass-roots level of the GOE. Process (emphasis added). MWRI has prepared a master IMT plan to the year 2025, culminating in a transfer program of selected main canals and drains" (IRG et al.; 2001a, emphasis added).

Some broad assertions, which sometimes border on wishful thinking, indicate faith in the project but also attempts to assuage doubts or hesitations. Multiple donor's projects show that "the farmers' organizational capability is already evident based on the establishment of a broad network of WUAs through the IIP program, the successful formation of BCWUAs under the APRP project, and the recent launching of the MWRI Water Boards Project" (IRG et al.; 2001a).

However some occasional assessment paint a less optimistic picture, like the 1993 evaluation of USAID-IIP by Devers Inc (1993) which suggested that the mesqas considered by the project as having reached the operational phase were "so only in rudimentary way" and that the WUA leadership was "still basically a non-management force expert in a very few mesqas". Unsatisfactory results spur calls for more resources and more training ("It is obvious also that implementing irrigation management transfer will require extensive resources for training members of BCWUAs and for the equipment necessary to carry out the BCWUAs functions", IRG et al.; 2002b); and IMT goals or the implementation of continuous flow become "long-term goals".

While it is understandable that consultants and project implementers display faith in both the nature of their objectives and the process to achieve them, these statements reveal also unqualified adherence to the policy solutions of the day (e.g. IMT or pricing) and a reluctance to alter the project beyond a point that might spell doubt on its relevance and weaken the resolve of the government.

6 Conclusions

Egypt has experienced a large and variegated number of projects devoted to farmers' institutional building at different scales, in line with the magnitude and importance of its irrigated sector. By and large, "Participation of WUOs in decision-making in water



management is extremely low if not completely absent and a formal procedure for involving WUOs doesn't exist" (APP, 2007: 32). Nevertheless for the (far) future both the MWRI field level and WUOs show considerable agreement on a much stronger role for the WUOs on most issues with the final decision assigned to the WUOs" (APP, 2007). This somewhat contradictory statement illustrates that while on the surface, and on paper, all parties see value in a stronger role for WUOs, their low performance generates calls for "more of it" or for "strengthening" those already established; rather than discussions on why they did not perform as expected, or on the feasibility of a policy without full legal backing and institutional commitment.

Experience with implementation of WUAs and BCWUAs have been characterized by a trial-and-error process involving numerous overlapping and sometimes conflicting institutional building interventions by various donor-funded projects. Some lessons have been learned (although the implications are sometimes disregarded) through a typical trial-and-error process. There now seems to be recognition that institutional development must come as the first step in the mesqa improvement process, before construction works (IRG et al. 1989). There have also been discussions about the timing of establishing WUAs, mesqa WUAs being established before, at the same time, or after BCWUAs (World Bank, 2005) according to different sources. In practice, however the two are developed quite independently from each other. Others also stress the need to first establish all integrated districts (IWMDs) within the larger hydrologic/organizational unit (Directorate) at one time, and then have IWMD staff organize and support BCWUA formation (El Atfi et al., 2007). This partly seems to have contributed to an instrumental approach in which BCWUA are designed to assist IWMDs. Still others promote establishing "water user organizations at the branch canal level, allowing for eventual expansion to the district level" (IRG, 1999a).

There is a clear disconnect between, on the one hand, the enthusiasm shown by donors, aid expert, and some officials convinced of the need for IMT and, on the other, the implementation level where understanding and acceptance of the reform is limited, which "results in misunderstandings, major irritations" (APP, 2007). It is apparent that the conceptions of participatory management in circles of decision making officials of the MWRI are "confused and sometimes contradictory" (APP, 2007). While some genuinely believe in the merits of shifting governance, the balance of power and responsibilities, many see participation as a means of increasing the contribution, in kind or cash, of end-users. There is however little evidence that this is actually being realized. It is telling that all the measures meant to instil a higher degree of cross-accountability or transparency are those that are loosely adhered to, even during the life time of the projects.

There are clear disincentives for most staff to fully embrace the logic of management transfer. Transfer is likely to be associated with a loss of prestige, power, legitimacy, and even jobs (Hvidt, 1998). For this reason, it is somehow odd to expect from the line agencies that they would support the reforms. This also poses the question of what is the exact role of the



Ministry in the establishment of farmer organizations. With regard to the establishment of the water boards, for example, the question was raised of whether the “power and freedom [was] to be entrusted to water users to create Water Boards, along with applying to MWRI for establishment request and support, or [was] MWRI to carry out the task of their establishment?” (APP, 2003). This structural constraint can be removed by strong high-level political will (overriding the agency’s preference for the *status quo*) and/or measures to relocate redundant staff or facilitate their hiring by the WUOs themselves; both measures/conditions that are absent in the Egyptian case. Some have raised doubts as to whether the MWRI top is fully committed to IWRM and water user participation independent of donor support, when it will significantly change the status quo (IRG, 2012). With regard to management, there are also difficulties for the managers to commit to ensuring a more predictable water supply because of the complexity of water management in the delta. Each level depends on how water is apportioned and distributed at upper levels, which reduces its autonomy in improving supply.

Whatever the reluctance from managers, most development projects also tend to minimize the transaction costs of the collective action that is requested from farmers, whether in cash, labour, time or other in-kind contributions (IRG, 1998b). In contrast the expected associated benefits are limited because of the lack of substantial improvement in water supply and the minimal shift in decision-making power. Expectedly the cost/benefit ratio to farmers remains too high and WUOs appear to be little sustainable. Only in the case where collective management is made unavoidable because of technological choices (notably the IIP and its collective pumps) do WUOs endure in one form or another, mostly out of necessity. Similar questions can be raised about the sustainability of BCWUAs or Water Boards at district levels, when tangible benefits, transfer of concrete responsibilities and legal status are not realized.



References

- Abdel-Aziz, Y. 2003. Decentralisation and water user participation. Water Demand Management Forum. IDRC.
- Abdelgawad, S.M.; Nasr-EIDin Allam, M. and H. Elgamal, M. 2010. Integrated water resources management practices in Egypt, a critical review and analysis. Fourteenth International Water Technology Conference, IWTC 14 2010, Cairo, Egypt.
- Abou-Seida, M.M. 2001. Societal participation in water management: the Egyptian SFD'S approach. Paper presented at the conference Globalization and Water Resources Management: The Changing Value of Water, August 6-8 2001, AWRA/IWLRI-University of Dundee.
- Allam, N.M. 2004. Participatory irrigation water management in Egypt: review and analysis. Options Méditerranéennes Series B, n° 48.123-131.
- APP (Advisory Panel project on water Management). 2003. Proceedings of the workshop on Water Boards: From pilot to policy, 12 April 2003, Cairo, Egypt.
- APP (Advisory Panel project on water Management). 2007. Proceedings of the workshop on Water Boards: From Policy to Strategy, 13-14 January 2007, Cairo, Egypt.
- APP. 2009. Governance in the Water Sector. The 43rd Panel Meeting Workshop. April 4th 2009, Cairo, Egypt.
- Attia, F. 2012. Regional experts group workshop - water users' associations in the SWIM-SM EGYPT. Powerpoint.
- Aziz, Y.A. 1995. Irrigation management transfer: development and turnover to private water user associations in Egypt. In Johnson, S. H.; Vermillion, D. L.; Sagardoy, J. A. (Eds.). Irrigation management transfer: selected papers from the International Conference on Irrigation Management Transfer, Wuhan, China, 20-24 September 1994. Rome, Italy: FAO. pp.427-442. (FAO Water Reports 5)
- Barakat, E. 2009. IWRM I branch canal water user association assessment. Report No. 5. EPIQ. July 2009
- Barakat, E. 2009. IWRM I branch canal water user association Assessment. Report no. 5. Integrated Water Resource Management II.
- Batt, H.A. and Merkley, G.P. 2009. Water management and user association analysis for irrigation improvement in Egypt. Irrigation and Drainage.
- Bron, J. 2003. Water Boards Project. User Participation in WM in Egypt and its Implications for Institutional Reform. Powerpoint.
- Devres, Inc. Evaluation of the Irrigation Improvement Project Component of the Irrigation Management Systems Project (Project 263-0132). Cairo: November 1993.



El Atfy, H.I.; Viala, E.; Fredericks, J. and Svendsen, M. 2007. Improving the performance of irrigation and drainage systems in Egypt through decentralization and participation. Paper presented at the ICID Conference, October 2007, Sacramento, CA.

El-Zanaty & Associates 2001. Knowledge, attitudes and practices of Egyptian farmers towards water resources. National Survey 2001. EPIQ Water Policy Reform Program (Report No. 54), Agricultural Policy Reform Project, United States Agency for International Development.

GreenCOM. 1999. Knowledge, attitudes, and practices of district irrigation engineers in Egypt: Impact Survey. Final Report Submitted to USAID/EGYPT.

Hvidt, M. 1995. Current efforts to improve irrigation performance in Egypt. Paper presented at The third Nordic conference on Middle Eastern Studies: Ethnic encounter and culture change, Joensuu, Finland, 19-22 June 1995.

Hvidt, M. 1998. Implementing new irrigation technology in upper Egypt: political and bureaucratic considerations. In Mollinga, P. (Ed), Water control in Egypt's canal irrigation – A discussion of institutional issues at different levels, pp. 23-40.

IFAD. 2005. Arab Republic of Egypt: Country Programme Evaluation. Rome: IFAD.

INECO. 2009. Institutional framework and decisionmaking practices for water management in Egypt: Towards the development of a strategy for water pollution prevention and control in the Bahr Basandeila region.

IRG (International Resources Group), Winrock International and Nile Consultants. 1998a. Egypt's Irrigation Improvement Program: Performance assessment, and proposed strategy. APRP-Water Policy Activity, Report No. 7. Cairo, Egypt: USAID.

IRG (International Resources Group), Winrock International and Nile Consultants. 1998b. Water user association formation outside the Irrigation Improvement Program area. APRP-Water Policy Activity, Report No. 9. Cairo, Egypt: USAID.

IRG (International Resources Group), Winrock International and Nile Consultants. 1999a. Establishment of branch canal water user associations in the Egyptian irrigation system. APRP-Water Policy Activity, Report No. 17. Cairo, Egypt: USAID.

IRG (International Resources Group), Winrock International and Nile Consultants. 1999b. Institutionalization of the Irrigation Advisory Service in the Ministry of public works and water resources. APRP-Water Policy Activity, Report No. 18. Cairo, Egypt: USAID.

IRG (International Resources Group), Winrock International and Nile Consultants. 2001a. MWRI policy on irrigation management transfer (phase I). APRP-Water Policy Activity, Report No. 36. Cairo, Egypt: USAID.



- IRG (International Resources Group), Winrock International and Nile Consultants. 2001b. MWRI policy on irrigation management transfer (main document). APRP-Water Policy Activity, Report No. 47. Cairo, Egypt: USAID.
- IRG (International Resources Group), Winrock International and Nile Consultants. 2001c. Integrated water management district. APRP-Water Policy Activity, Report No. 49. Cairo, Egypt: USAID.
- IRG (International Resources Group), Winrock International and Nile Consultants. 2002a. Integrated water management district: MWRI plan for pilot implementation. APRP-Water Policy Activity, Report No. 62. Cairo, Egypt: USAID.
- IRG (International Resources Group), Winrock International and Nile Consultants. 2002b. Assessment of the impacts of the water policy reform program. APRP-Water Policy Activity, Report No. 58. Cairo, Egypt: USAID.
- Kotb, T. 2010. Water User's Associations in Egypt: Outstanding Experience and Tremendous Challenges. Powerpoint of General Director Central Unit, Integrated Irrigation Improvement and Management Project.
- Lowdermilk, M.K. and Barakat, E. n. d. Benefits and costs of establishing private water user associations for large public gravity systems: the Egyptian experience. Mimeo.
- Merrey, D.J. 1998. Governance and institutional arrangements for managing water resources in Egypt. In Mollinga, P. (Ed), Water control in Egypt's canal irrigation – A discussion of institutional issues at different levels, pp. 1-22.
- Metawie, A.F. 2002. Egypt: the role of water users' associations in reforming irrigation. ToolBox du GWP
- Mollinga, P.; Merrey, D.J. and Radwan, L.S. 1998. Water control in Egypt's canal irrigation – A discussion of institutional issues at different levels. "Liquid Gold" program, Wageningen Agricultural University.
- Moustafa, M.M. 2004. Can farmers in Egypt shoulder the burden of irrigation management? Irrigation and Drainage Systems 18: 109-125.
- Ophèle, C. 2004. Etude du fonctionnement d'un système hydraulique en cours de transformation: le canal d'irrigation El Resqa, delta du Nil. Mémoire de DEA, ENGREF: Paris.
- Radwan, L.S. 1998. Farmer responses to inefficiencies in the supply and distribution of irrigation water requirements in delta Egypt. In Mollinga, P. (Ed), Water control in Egypt's canal irrigation – A discussion of institutional issues at different levels, pp. 40-60.
- RTB. 2010. Socio-economic Evaluation of Fayoum Water Users Organization Project (Phase II). Impact evaluation study for the Irrigation Advisory Services at Fayoum, Ministry of Water Resources and Irrigation.



Australian Government
**Australian Centre for
International Agricultural Research**



Shalaby, A.R.; El Gamal, F. and Ali, H. 2004. Participatory water management in Egypt: country review. Options Méditerranéennes Series B, n° 48.113-122.

World Bank. 2005. Project appraisal document on a proposed loan in the amount of US\$120 million to the Arab Republic of Egypt for an Integrated Irrigation Improvement and Management Project (IIIMP).

World Bank. 2007. Irrigation Improvement Project. Implementation completion and results report (IBRD-38320 IDA-26720). Washington, DC: World Bank.

World Bank. 2007. Irrigation Improvement Project summary.
<http://go.worldbank.org/PIXQY2FDQ0>.