Water Users Associations in the NEN Region

IFAD interventions and overall dynamics

Submitted to IFAD

Draft

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October 2012

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Abbreviations and Acronyms

ADB: Asian Development Bank

AFD: *Agence Française de Développement*

AIOJSC: Amelioration and Irrigation Open Joint Stock Company (Azerbaijan)

AUEAs: *Association d'Usagers de l'Eau Agricole* (Morocco)

BCWUAs: Branch Canal Water User Associations (Egypt)

CMO: Canal Management Organization (Kyrgyzstan)

CRDA: *Commissariats Régional au Développement Agricole*, or regional authorities of the Ministry of Agriculture (Tunisia)

CSU: Central Support Unit

DPRDP: Dhamar Participatory Rural Development Project (Yemen)

DR: Développement Rural (Morocco)

DSI: *Devlet Su İşleri*, or the General Directorate of State Hydraulic Works (Turkey)

FAO: Food and Agriculture Organization of the United Nations

FMIS: Community- and Farmer-Managed Irrigation Systems

GDA: *Groupement de Développement Agricole* (Tunisia)

GSLRP: Gash Sustainable Livelihoods Regeneration Project (Sudan)

GTZ: German Technical Cooperation

IAS: Irrigation Advisory Service

IAs: Irrigation Associations

IDA: International Development Association

IDs: Irrigation districts

IDSMIP: Irrigation Distribution System Management Improvement Project (Azerbaijan)

IFAD: International Fund for Agricultural Development

IIIMP: Integrated Irrigation Improvement and Management Project (Egypt)

IIP: Irrigation Improvement Projects (Egypt)

IMS: Irrigation Management Systems

IMT: Irrigation Management Transfer

ISF: Irrigation Service Fees

IWMD: Integrated Water Management Districts (Egypt)

IWMI: International Water Management Institute

JCC: Jordan Cooperative Corporation

JICA: Japan International Cooperation Agency

JVA: Jordan Valley Authority

KfW: *Kreditanstalt für Wiederaufbau* (Germany)

LRA: Litani River Authority (Lebanon)

MENA: Middle East and North Africa

MOIWR: Ministry of Irrigation and Water Resources (Sudan)

MWRI: Ministry of Water Resource and Irrigation (Egypt)

NEDP: North-East Development Project (Azerbaijan)

NEN: Near East and North Africa

NGOs: Non-Governmental Organizations

O&M: Operation and Maintenance

ONID: *Office National de l'Irrigation et du Drainage* (Algeria)

ORMVA: *Office Régional de Mise en Valeur Agricole* (Morocco)

PDA: *Projet de Développement Agricole* (Morocco)

PDARI: *Projet de Développement Agricole et Rural Intégré* (Tunisia)

PIM: Participatory Irrigation Management

PRODESUD: *Programme De Développement Agro-Pastoral Et De Promotion Des Initiatives Locales Du Sud-Est* (Tunisia)

RCIDP: Rehabilitation and Completion of Irrigation and Drainage Infrastructure Project (Egypt)

SAIC: State Amelioration and Irrigation Committee (Azerbaijan)

SDC: Swiss Agency for Development and Cooperation

SGB: Sudan Gezira Board

USAID: United States Agency for International Development

WB: World Bank

WBs: Water Boards

WUAs: Water User Associations

WUGs: Water User Groups

WUOs: Water Users Organizations

YARDP: Yarmouk Agricultural Resources Development Project (Jordan)

1 Executive summary

1.1 Background

1.2 Objectives

1.3 Key findings and Lessons

2 Introduction

2.1 Background

Between the 1960s and 1980s huge capital investments in large-scale public irrigation have been made by centralized governments. In the mid 1980s it became clear that many of these investments, particularly in developing countries, were not achieving the increases in productivity that were expected (Hunt, 1989). A common perception of the causes of the problem was that upstream control systems had generally been designed with no consideration of the problems faced by farmers in securing local control over irrigation water, and that farmers were not sufficiently involved in the different aspects of management, including financial ones (Freeman and Lowdermilk, 1991).

More worryingly, hydraulic infrastructure started to deteriorate due to lack of funds for adequate maintenance and efficient operation, poor quality of construction, lack of protective measures for canal embankments, destruction of hydraulic structures by the users themselves when these hampered supply to their fields. It was not anticipated that rehabilitation of the system would be needed so early; in some cases less than ten years later construction, and sometimes repeated times (Indonesia being an illustration). Underinvestment in maintenance remains, to these days, considerable. For instance, total O&M requirements for public systems in India have been assessed at about Rs. 25-30 billion per year, yet less than a quarter of this amount is actually provided, with wide variation across states (Thakkar, 2000) and revenue receipts covering only 10% of expenditures in 2000 (Sur and Umali-Deininger, 2003). In Egypt, a desirable level of expenditures on O&M/ rehabilitation has been put at US$234 million a year, yet only US$164 million is provided (Bazza and Ahmad, 2002). In Azerbaijan, the 2012 O&M budget was US$36 million, against an estimated needed budget two times higher (van den Boom, 2007). The recurring O&M costs of large irrigation and water investments amount to a fiscal burden for the public sector that is, for many governments, unbearable.

In the past three decades many countries in the NEN region and elsewhere have re-organized or reformed their water sector. These reforms included a wide variety of activities such as scheme rehabilitation, community development, capacity building, decrease in subsidies and price-fixing schemes, institutional building, development of strategies and legal frameworks. Donors and development banks have increasingly shrouded their projects in a participatory rhetoric, whereby water users/beneficiaries would build a sense of ownership (of infrastructure or organisations) and co-manage irrigation systems, with emphasis on the concepts of Participatory Irrigation Management (PIM) and Irrigation Management Transfer (IMT). Such policies emerged in a neo-liberal context of structural adjustment and broke away from the idea that water has to be exclusively managed by the state and its institutions. By organizing ‘water users’ in groups and organizations they could take over specific responsibilities and tasks in water management that the state was no longer capable of, or willing to, finance. These new ‘participatory’ policies ranged from increasing users’ involvement in irrigation management as a supplement to state management (PIM) to transferring full responsibility and control over resources to organized users (IMT), as we will examine in next section.

Initially, these policies were inspired by the idea that it is possible to replicate in public schemes the kind of local self-governance commonly observed in communal irrigation systems (Hunt and Hunt, 1976). Many donors and governments supported the transfer of management responsibilities to farmer and their organizations, with the aim to improve the accountability of the irrigation service to farmers, make this service more cost-effective, motivate farmers to

invest more in maintaining irrigation systems and, ultimately, make irrigation systems more productive and sustainable (Moustafa, 2004).

The literature, however, provides strong evidence that the financial difficulties experienced by most governments have been the driving force – or at least the chief justification – behind the revision of pricing policies, and also of many programmes of participatory irrigation management and varied degrees of turnover of management to farmer collectives (Frederiksen, 2005; Molle and Berkoff, 2007b; see for example Burger, 1998 on Kazakhstan; Çakmak et al., 2004 on Turkey; and Rap, 2004 on Mexico). As made explicit by Dr Abu Zeid, a former Egyptian 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*". The Ministry of Water Resources and Irrigation took many positive steps in the direction of participation and more efficient involvement of stakeholders in water management" (APP, 2007). Shifting part of the O&M burden onto farmers, at a minimum the costs related to the on-farm and tertiary canal levels, became a central objective of many governments.

This objective, however, was more often than not primarily pushed by aid agencies and development banks. In almost all cases, farmers' organizations were created within integrated irrigation projects financed by the World Bank (WB), the Asian Development Bank (ADB), the Food and Agriculture Organization of the United Nations (FAO), German Technical Cooperation (GTZ), International Fund for Agricultural Development (IFAD), KfW, Agence Française de Développement (AFD), the United States Agency for International Development (USAID), the Japan International Cooperation Agency (JICA), Swiss Agency for Development and Cooperation (SDC), International Development Association (IDA), Islamic Development Bank (IDB), etc. These donors had an interest in the physical and financial sustainability of their investments and often made the formation of formal WUAs a pre-condition to their loans or grants. They were also influenced by the neoliberal discourse on 'rolling-back' the state and privatization, and saw WUAs as private entities that would eventually be clients of an agency turned service provider, and pay the full cost of their production factors. The formation of water user organizations came to be seen as standard dispositive on any development project.

The name given to these farmer water groups or organizations differs from country to country, depending largely on the country's institutional set up, its history and culture. For example, in Turkey, the following terms are used in English: 'Irrigation Associations' (IAs), 'Water users' Organizations' (WUOs) and 'Water User Associations' (WUAs). Morocco uses the terms 'Communautés d'Irrigants' and 'Association d'Usagers de l'Eau Agricole' (AUEA). Tunisia uses 'Groupement de Développement Agricole' (GDA) since 2004. Egypt uses the term 'water user association' (*rabta*) for tertiary mesqa-level (tertiary level) in the old lands of the Nile Delta, 'Water Users' Unions' (WUU, or *itihad*) for the news lands and 'Branch Canal Water User Associations' (BCWUAs) for the secondary level. In Yemen there was a shift from 'spate committees' in traditional systems to Water users' Organizations (WUOs). The shift was from 'spring committees' to WUA in Jordan. In Sudan, the term 'Farmers' Unions' is common. In Central Asia and the Caucasus, 'Water Users Unions' are used at the secondary canal level in Azerbaijan and Uzbekistan. In Algeria the socialist agricultural policy led to collective farms or 'Exploitation Agricole Collective' (EAC) since 1987. The same organization is found in Syria under the name 'Farmer Unions'. To simplify, the term WUA is used in this study as a generic term to refer to all the above farmers' irrigation groups.

Yet we will have to distinguish between two main situations. In large-scale public schemes the term WUA will, with a few exceptions, refer to associations corresponding to the secondary or (more frequently) tertiary level of the irrigation system. These WUAs co-manage – to different degrees - the scheme with an irrigation agency. For smaller schemes WUAs refer to entities that

are taking care of a communal irrigation scheme. Most of the times formal WUAs are traditional bodies that have been formalized, often for the sake of being eligible for some aid or development project. These WUAs are generally meant to be more autonomous, and although the state may control their functioning it is expected (and hoped) that they can be financially sustainable.

2.2 The PIM-IMT continuum

Because participatory rhetoric has become so pervasive in the development field, terms like Participatory Irrigation Management (PIM) have become common currency and are used in quite different situations. In the domain of large-scale public irrigation, PIM's departure point is a situation where the state (or one of its agencies) manages and maintains an irrigation facility that delivers water, by gravity or under pressure, to end-users. These end users may be individuals or groups of water users who share a common outlet.

Farmers are expected to 'participate' in three main different ways or areas: they can contribute to water management, maintenance, and/or to recovering financial costs. In practice farmers already often cover these three areas at the quaternary and plot levels (where they distribute water, maintain ditches and furrows, pay for fuel or electricity when pumping is involved, etc). In many cases, the agency is only responsible for (and only interested in) the management of water down to the intake of the tertiary canal, after which the group of farmers dependent on a particular intake has to share water, and sometimes to maintain the tertiary infrastructure.[1]

PIM generally leaves these boundaries of responsibility unchanged but aims at intensifying the role or the contribution of farmers in a particular area: typically farmers will be asked to form Water User Groups, or Water User Associations, at the tertiary level with the expectation that this would help them better manage the distribution of water, carry out maintenance tasks collectively, and sometimes collect water fees for the agency (although the fees collected can be also kept locally and used by the WUA, in part or fully). Other expected benefits–mostly from the point of view of the agency- include creating formal associations with whom they can deal (rather than having to respond to numerous individual farmers and as many claims), hence better communication, or other tasks possibly assigned to WUAs (like collecting information on planned or actual cropping patterns). Even if formal WUAs are not formed, PIM policies may be directed at increasing the contribution of farmers in one particular area. As a result the degree of participation may vary considerably, in both extent and intensity, and what comes under the name of PIM or other similar expressions has to be ascertained in each case.

The concept of Irrigation Management Transfer, or IMT, as defined by Garces-Restrepo et al. (2007), "normally refers to the process that seeks *the relocation of responsibility and authority* from the controlling government agencies managing irrigation systems (under the public sector) into the hands of non-governmental organizations (NGOs), such as WUAs, or other private-sector entities. Usually, these are established as recipients of the transfer or handover of management".

The difference between IMP and PIM may not, therefore, lie in the formal establishment of WUAs, but, rather, in the way attributions of the agency and users are redefined. These attributions generally relate to decision-making power, typically on the way water is allocated, maintenance priorities defined or works carried out, and who covers the costs of sustaining the supply of water (whether this is in cash or in kind). Flows of water and money are intertwined

[1] *This division point also often defines the boundary of the respective mandates of the irrigation/water and the agriculture ministries, in countries where these two ministries coexist (like in Egypt or Syria).*

since money (defined in terms of amount but also by source and allocation) governs the physical sustainability of the system as well as, in part, how managers operate the system.

In other words a policy that comes under the name of IMT must effectively transfer not only a burden or a task, but also a parcel of decision-making power and/or enhance the cross-accountability between the agency and users. Under PIM the agency keeps full control of all essentials tasks and flows; under IMT farmers have a parcel of decision-making power in one of the three key areas outlined above. In short, they do not only have to only shoulder additional costs, they also receive increased benefits, with the implicit assumption that the latter will be greater than the former.

The distinction made resembles the distinction made between instrumental and transformative participation. Many social scientists have theorized participation between several levels, ranging from manipulation to citizen control (see Arnstein's (1964) 'ladder' and Cornwall, 2008). 'Functional participation', according to Cornwall (2008), "*captures the form of participation that is most often associated with efficiency arguments: people participate to meet project objectives more effectively and to reduce costs, after the main decisions have been made by external agents. This is perhaps the most frequently found type of participation in development*".

In the field of *water management*, empowerment of farmers typically gives them a say on issues beyond the tertiary or farm levels: seasonal water allocation at the secondary level, definition of distribution schedules, monitoring of water status, etc. These may be achieved in tandem with the agency under a type of co-management. But formal accountability mechanisms are often the key factor that distinguishes a co-management, where farmers sit at the table but are mostly consulted (in which case we are in a PIM situation), from a transfer situation. What is often referred to as 'bulk allocation' is a seasonal planning that deals with the allocation of *volumes* of water to particular areas (typically secondary canals); this allocation may sometimes even be defined at a finer temporal grain (e.g. monthly volumes, or *n* successive turns). A situation of transfer would include a written engagement between the WUA and the agency, whereby the latter would commit itself to deliver these specific amounts. In some cases WUAs can distribute their quota along the season as they see fit (eg Morocco or Jordan), or even shift part of it –if unused- to the next season. Scheduling is also formalized, and the duration and amount of water to be supplied at each rotation are specified. Whether allocation and actual distribution are effectively jointly monitored and assessed, is yet another step towards greater accountability and transfer. In such a situation predictability of supply is generally improved and farmers clearly benefit.

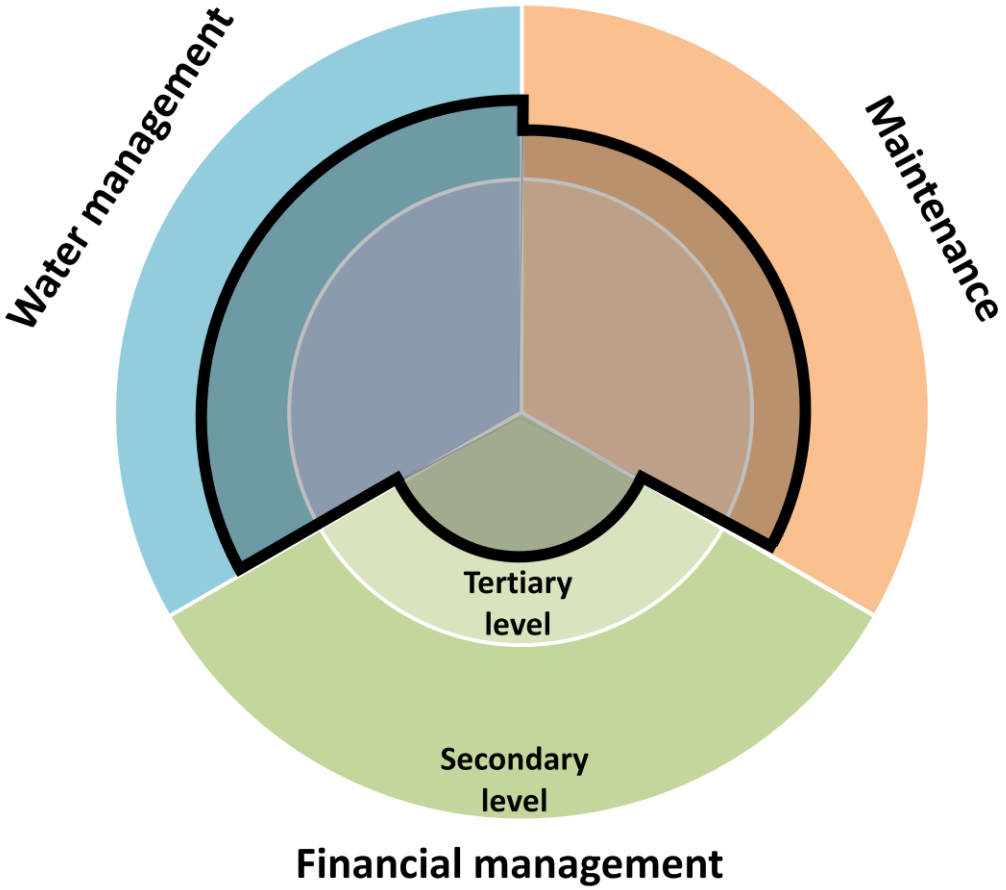
In the *field of maintenance*, PIM may include the participation of WUAs in the definition and prioritization of the work to be done. IMT would include a contract which defines the commitments of both sides, the contracting of WUAs for executing some works, or their autonomy to chose their own contractors, the formal joint evaluation of the works done (which can be refused by WUAs if they consider the execution to be faulty), the transfer of machinery to the WUAs which become service providers, etc.

Financial management will in general be altered by IMT, in line with the redistribution of responsibilities in the two other fields. Farmers may mobilize more financial resources to pay for gate-operators (chosen by them and replacing earlier agency staff, although these may be hired again by the WUA), or even directly contributing to covering the salary of agency staff, or to cover a larger part of maintenance expenditures. On the other hand WUAs may also generate income by various means (providing seeds or fertilizers, collectively marketing produce, providing services for maintenance, selling water to third parties like small municipalities, to etc). This is referred to as the 'horizontal expansion' of WUAs, whereby their attributions are widened (see §6.7). It must emphasized that 'who pays what' is not only a question of distribution of costs but also governs the decision-making power that goes with it (see §8.3). In what Small and Carruthers (1991) once termed the 'financing of irrigation', farmers' cash contributions

through water fees do not merely accrue to the overall state's revenue, but are –ideally- partly used internally (for WUAs' expenditures) and partly to pay agency's staff, thus creating a powerful mechanism of accountability that is expected to increase the quality of supply; and to empower farmers accordingly. Expectedly, this system is not often implemented.

We can summarize these statements by the following chart, which illustrates the three main areas of responsibility and the two levels concerned (secondary and tertiary)[2]. A shaded area represents (qualitatively) the extent of WUAs' decision-making power, in a hypothetical case.

Figure 1. WUAs' three main domains of responsibility



2.3 Assessing WUAs' performance

How do we know that a WUA is "performing"? The question may sound misplaced as it may seem evident that WUAs' effectiveness should be judged against a set of criteria and indicators that reflect the objectives and tasks ascribed to them (improve water management, fee collection, maintenance, etc). This, however, is not as straightforward as it might look:

[2] *One could have also shown a third ring corresponding to the primary/main level. But as this level is very rarely transferred (in which case we would have a situation close to full privatization), we are not showing it in order to keep the chart simple.*

- A first difficulty refers to the complexity of identifying causal links: whether yields have increased (or not) after PIM/IMT might be related to a set of variables and causes (prices, rainfall, pests, labour shortage, etc) that are not easy to unpack and have little to do with the reform. For example, a reduction in water abstraction by farmers may be ascribed to the establishment of the WUA while it is in fact a consequence of less water being available at the river basin level, better precipitations, or a shift from surface to groundwater.
- PIM/IMT is by nature a social process and the quality of this process –changes in behaviors, social interactions, sense of responsibility, accountability mechanisms, etc- is very hard to capture on a quantitative scale, especially when –to take one caricature example- the effectiveness of a WUA is measured by, say, the number of meetings it held. It is apparent that site-specific conditions (eg the presence of a charismatic leader, influence of party politics, etc) are often paramount in explaining social dynamics, while not well captured by indicators.
- Because of the diversity of situations, where WUAs may perform different tasks in different ways, it is often difficult to draw a line between WUAs which would be 'successful' and others which would have 'failed' (although of course non-existing ones can easily be put in the second category). Rare are those who fully perform as expected in all their components but they may sometime be achieving one particular objective, while not performing well on others; or the process may lead to changes that were not expected, and might even draw benefits in other areas.
- Likewise, some countries (eg Kyrgyzstan, Uzbekistan) have a large diversity of situations that is poorly captured by the literature that presents and discuss policy results at the country level, or takes one particular case and extrapolates the conclusions to the country. We suspect, for example, that countries like Azerbaijan (and probably Turkey) would reveal contrasting dynamics if we had in-depth surveys over a large number of cases; the only literature available originates from projects or papers on national experience, and these generally offer very 'averaged' and evened-out views.
- Another issue lies with the bias attached to the assessments carried out and published. Most of the literature originates from persons belonging to ministries, companies, or aid agencies that are linked to these projects and merely publicize their results in a summary and uncritical manner. In addition most of the assessments are done while the project/policy is still running, or a very short time afterwards, and changes are frequently reported in a partial and/or vague way. There is a sheer lack of independent, comprehensive, long-term assessments, which makes it very difficult to discuss the sustainability of any arrangement or reform.

Few comparative studies have tried to assess quantitatively the effectiveness of WUAs. Garces-Restrepo et al. (2007) based their global assessment on indicators like O&M costs for both governments and WUAs, rate of fee collection, timeliness and equity of water delivery, and tried to quantify their impacts on crop yield and farm income. Mukherji et al. (2009) looked at the experience with PIM/IMT in Asia and identified other additional quantitative indicators such as financial viability of WUAs, quality of infrastructure, in addition of indicators related to water management (equitable distribution of water, reliability and adequacy in water distribution, reduction in frequency of disputes). They also quantified their effects on crop yield and also on the overall livelihood of farmers.

Despite having to contend with fragmentary and incomplete evidence, these studies have offered some quantitative insights in the transformations triggered by IMT policies (Garces-Restrepo et al., 2007) and both PIM and IMT (when analyzed together: Mukherji et al., 2009).

In the particular context of this study, the literature corresponding to the NEN region did not allow us to code the different cases and pursue such quantitative comparisons. Most

documents, and IFAD project reports in particular, are very general (even for countries like Morocco and Turkey, which are frequently credited with some degree of success) if not impressionistic, which led us to limiting our analysis to qualitative insights.

2.4 Methodology

With the limitations underlined above, this study is based on a comprehensive literature review on water management and WUAs in the NEN region. All relevant documents on IFAD projects in the region that included a component on setting up or strengthening WUAs were also examined. These twelve IFAD projects were located in the seven following countries (see Appendix 1 for more details on the projects):

Egypt: West Nubaria Rural Development Project (WNRDP)

Tunisia:

- Programme De Developpement Agro-Pastoral Et De Promotion Des Initiatives Locales Du Sud-Est (PRODESUD)
- Projet de Développement Agricole et Rural Intégré (PDARI) de Siliana
- Projet De Developpement Agricole Et Rural Intégré de Siliana (Phase II)
- Projet de Développement Agricole et Rural Intégré (PDARI) de Zaghouan

Morocco :

- Projet de Développement Agricole (PDA) dans les Zones Montagneuses de la Province d'Al-Haouz
- Développement Rural (DR) de Taourit-Taforalt

Azerbaijan: North-East Development Project (NEDP)

Sudan: Gash Sustainable Livelihoods Regeneration Project (GSLRP)

Yemen: Dhamar Participatory Rural Development Project (DPRDP)

Jordan:

- Yarmouk Agricultural Resources Development Project (YARDP)
- Yarmouk Agricultural Resources Development Project (YARDP II)

Because IFAD documents turned out to contain little information on the inner workings of WUAs - only one of the above projects (NEDP) had the support of WUAs as a main objective-, it has not been possible to carry out an in-depth assessment of IFAD's approach with regard to setting up WUAs, nor on the determinants of their degree of success/un-success. We have therefore used IFAD projects to illustrate the various observations and analyses made on the wider sample of cases. Pieces of information relative to IFAD projects are presented in boxes. In the conclusion, we also try to identify a few commonalities of IFAD projects and to draw some conclusions on how WUAs are dealt with.

In addition to the literature, three IFAD projects (Egypt: West Nubaria Rural Development Project; Tunisia: PDARI Siliana and Zaghouan; Morocco: PDR de Taourit-Taforalt) have been visited by IWMI researchers who carried out a Rapid Rural Appraisal and wrote terms of reference for local consultants to carry out more detailed surveys. The results of these surveys are presented in Volume 2.

The literature review identified the following relevant key-words for the NEN region: Irrigation, management, farmer community, water user, association, organization, agency, transfer, participatory, performance, efficiency and the countries of the NEN region. These words were

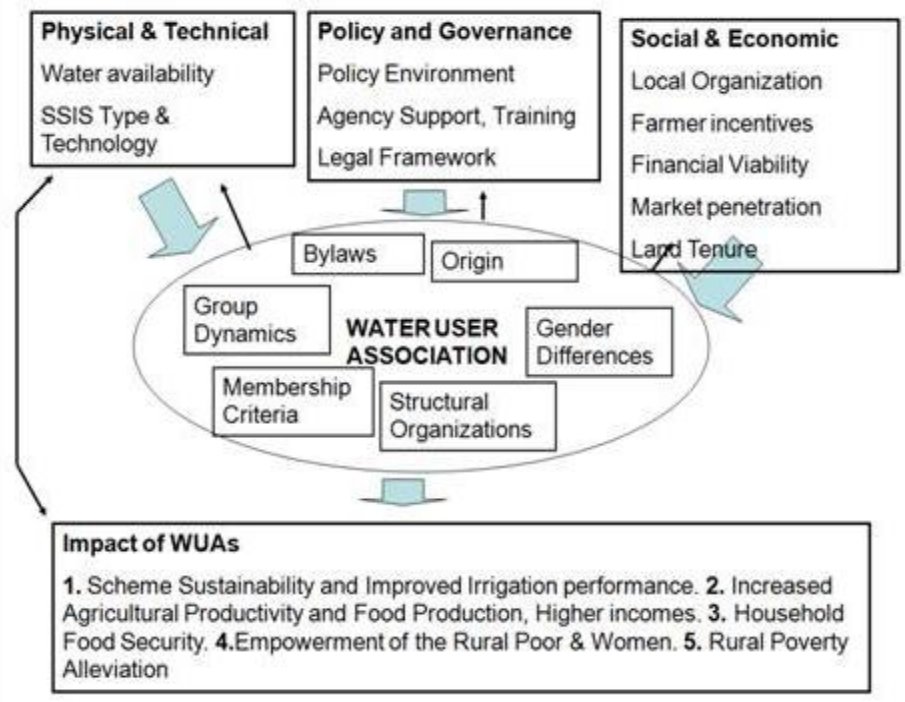
used in Cab Direct and Water Resources Abstracts bibliographic databases. Including the more general literature on PIM/IMT around 500 documents have been consulted.

Additional information obtained through the three case studies and personal contacts (Jordan valley, Azerbaijan, Turkey, Sudan, Maghreb, Yemen) were key, in most cases, to allowing us to come up with a clearer and more detailed picture of the situation.

For analytical purposes we have distinguished between two main situations: the first category includes farmer-managed (generally small) schemes. These schemes are in most cases communal schemes based on a spring, a river diversion weir, a qanat, or a well that have been built, managed and maintained by farmers, but where a formal WUA has been set up; there are also cases of new schemes established by the state (typically a collective well) that users are supposed to take over and handle more or less autonomously. The second category includes large-scale public schemes, run by a state agency. These schemes can be fully operated by gravity but they can also be hybrid, with water being distributed under pressure after a given level (secondary, tertiary, sub-tertiary, or individual). IMT refers to the second category, where the interface between the state and water users is the critical issue; but many aspects, such as the conditions needed for successful collective action, are shared or similar.

For this study we draw and build on a conceptual framework that was originally developed for the examination of WUAs in IFAD projects (IFAD, 2001). This conceptual framework analyses the performance and sustainability of WUAS and distinguishes external and internal factors which are of influence. **External factors** include the policy environment, the legal framework, the physical and technological aspects of water users' capacity for water management and socio-economic factors. **Internal factors** encompass the origin of WUAs, membership criteria, the structural organization and internal group dynamics. The framework broadly defines the possible impacts of WUAs, by not only focussing on scheme sustainability and improved irrigation performance, but also on increased agricultural productivity and incomes, food security, empowerment and poverty alleviation (IFAD, 2001). Several authors have later refined components of this framework. Wegerich (2010) gives a useful overview of these contributions.

Figure 2. Conceptual framework for the analysis of WUAs (Jordans, 2001)



Although we have used this framework somewhat loosely, several components reverberate with it. Our selection of internal and external factors is based on a recent literature review and the factors that were crucial in the large diversity of WUAs in the NEN Region that we reviewed.

As external factors we identified: - Legal framework and definition of roles; - The predictability of water supply; - Early participation of users in projects; - Capacity building and training; - Rehabilitation/status of the hydraulic infrastructure; - Speed vs. effectiveness of the transfer

As internal factors we identified: - Elections, board nominations and political interference; - Social homogeneity and social capital; - Leadership; - WUA's capacity and commitment; - The origin of the WUA; - Accountability and transparency; - Diversification of activities and horizontal integration.

After this introduction, the second section presents a short summary on irrigation and PIM/IMT policy dynamics in each country. This is mostly intended to give the reader not acquainted with the region some background data. Readers familiar with the NEN region can jump to section 4 which describes community-managed irrigation schemes and analyzes their sustainability concerns as well as the impacts of state interventions on such systems.

Section 5 focuses on large-scale public schemes and briefly reviews the performance of WUAs in the three responsibility domains introduced earlier (water management, maintenance, financial management). Section 6 and 7 review the internal and external factors influencing the performances of WUAs in large-scale irrigation systems. External factors include both the boundary conditions (legal environment, reliability of water supply) and policy choices about the nature and pace of policy implementation.

We have not attempted to establish statistical relationships between relative success in the three domains and particular internal or external variables, or sets of variables. This is due to the weakness of the literature that reports on specific cases and to the other reasons made explicit in section 2.3. From a qualitative point of view it is apparent that no variable is either necessary or sufficient. There are counter-examples for each of them. It remains that a tightly-knit community with strong leadership and dependence on agriculture will have a higher probability to perform well than one that is riddled with conflicts and has a chaotic access to water. There might be a set of rules, like the 8 ones proposed by Ostrom for common-pool resources, which correlates positively with a higher likelihood of success, but a large number of well documented cases is necessary to identify them.

In section 8 we reflect on the cost/benefit ratio of reforms and try to classify our different countries along a PIM-IMT axis, examining in more details how decision-making power is distributed. That takes us to two additional reflexions on the importance and diversity of financial flows, and on the wider political economy of reforms. Section 9 provides some conclusions and a recap of the most significant results of the review.

3 Institutional settings and dynamics of WUAs

From the late 1980s onwards, institutional reforms have been introduced to water management in almost all of the NEN countries, as in many other parts of the world. With the support of donor-funded programmes, governments established formal Water Users Organizations (WUOs) or Water Users Associations (WUAs) to take over some of the irrigation management tasks that were publicly managed before. This led to varying degrees of water user participation in the operation, maintenance and administration of irrigation systems. In most cases, laws have been formulated and legal arrangements adapted to provide a legal status for these WUAs. For the purpose of presenting the contexts in which such reforms occur, we divide the NEN region in five main areas, taking in account geographical[3] and historical factors.

3.1 Central Asia and the Caucasus

In the 1940s, the Union of Soviet Socialist Republics introduced large-scale irrigation infrastructure in order to increase agricultural production of cotton and wheat for an empire at war (Kitamura, 2008). Under Stalin, large-scale state and collective farms, *sovkhozes* and *kolkhozes*, became responsible for this irrigated production within a centralized planning and bureaucratically managed system. As a result, the institutions assuring "on-farm water management" (secondary level) were the farms themselves (Gunchinmaa and Yakubov, 2010).

In the late 1980s, with the decline of the Soviet Union these state and collective farms collapsed, as well as the bureaucratic apparatus that enabled centrally led agricultural production. An increasing number of smaller agricultural units emerged in countries such as Kyrgyzstan, Azerbaijan, Tajikistan and Uzbekistan. As a consequence, the disintegrating bureaucratic system in charge of irrigated production was no longer capable of dealing with this emerging complexity. The fragmentation of land complicated water management, because it multiplied individual demands, making design and implementation of water distribution plans difficult (Ul Hassan et al., 2004).

In the midst of this wider crisis of the Soviet state, land and water reforms were inextricably connected to the structural reforms of the state-led and central planning system into a market-based economy. To this purpose, international organizations promoted different neoliberal policies such as privatization, decentralization and market deregulation.

However, the trajectory, pace and depth of these agrarian and water reforms differed a lot per country. Some countries in the region already initiated reform processes before independence from the Soviet Union. After independence these institutional reforms gradually continued. In irrigation management these institutional changes had a different impact (Gunchinmaa and Yakubov, 2010). For example, Kyrgyzstan currently has a fairly elaborate legal water framework and has transferred the management of most of the secondary canals to newly formed WUAs. However, Tajikistan and Uzbekistan have been adopting irrigation reforms with a much more moderate pace, which was more in line with maintaining a prominent role for the state in planning agricultural production. Because the state either formally or informally determined cropping patterns, i.e. wheat and cotton in Uzbekistan and cotton in Tajikistan (Ul Hassan et al., 2007), water management could maintain a more centralized model. A general problem for most

[3] *In this Chapter we generally use recent data from the World Bank to give an overall picture of irrigated agriculture in individual countries (World Bank, 2010).*

countries is that the irrigation infrastructure remains in serious need for repair and rehabilitation (Ul Hassan et al., 2007; Gunchinmaa and Yakubov, 2010).

In **Azerbaijan** 1.5 million hectares are irrigated, which is 30% of its agricultural land. Surface irrigation is used on 65% of the irrigated area, and 35% is irrigated with lift irrigation. The collector-drainage networks (both off-farm and on-farm) serve about 45% of the irrigated area.

Water reforms have gradually followed the land reforms. The Agrarian Reform Law of 1996 has created the basis for the privatization of agricultural lands (Rzayev, 2007). Of the total of 8,6 million of hectares, 44% remained state property, 24% was privatized and 31% was transferred to local municipalities (Ahmedzade and Aliyev, 2003, cited by Rzayev, 2007). The latter group of new owners received free pieces of land from the state. The Law on Irrigation and Land Reclamation, adopted in the same year, specified the legal status of land reclamation and irrigation, as well as the property rights for water infrastructure. Since 1997, the payment of water services was introduced and promoted. In 2006, tariffs in rehabilitated areas were fixed on the basis of used water volumes. The Water Users Unions' (WUUs) reference charter was registered by the Ministry of Justice in 2005 through an amendment to the Land Reclamation and Irrigation Law. The alleged main purpose of these WUUs is to supply irrigation water in an organized, equitable and efficient manner to all users (Rzayev, 2007) but cost-sharing is an overriding objective.

The landscape of **Kazakhstan** is dominated by deserts and steppes. In 1992, 6% of its agricultural lands, 2.3 million hectares, were irrigated. Reforms of state-led water management in Kazakhstan were following land reforms and took place in two phases. The first phase addressed the transformation of the former state and collective farms into collective enterprises, production cooperatives, and joint stock companies. The second phase took place after the Bankruptcy Law of 1998. This phase was characterized by the liquidation of the cooperatives and the expansion of the role of private and peasant farms (Wegerich, 2008). In spite of the reforms, Kazakhstan has maintained a centralized administration in which the president fully controls the appointment of regional and municipal *akims* (administrative heads). The official argument that was used against delegating responsibilities to these *akims* was that regional authorities were not ready for these new responsibilities and also not financially prepared to hold elections (Kangur, 2008).

Although some privatization occurred after the decline of the Soviet Union, the bulk of Kazakstan's agriculture remained organized in 7,000 to 8,000 state and collective farms that averaged 35,000 to 40,000 hectares each. The state also has maintained control over agricultural inputs, equipment, processing and marketing.

According to the Kazakhstan Water Code of 2003, the central government ensures state management of water resources through the authorized management body (Committee for Water Resources) and River Basin Organizations. At the regional level, representative bodies and executive bodies of the state provided implementation and control of the national water management programs. Regional public organizations maintained the state owned water facilities. The new law (RK Law No 404–11) of 2003, allowed non-legal entities or private farms to become members of WUAs.

In particular international donors such as the World Bank and the Asian Development Bank promoted the formalization of WUAs in Kazakhstan and Kyrgyzstan (Kangur, 2008; Wegerich, 2008).

In **Kyrgyzstan** irrigated land represents 1.04 million hectares, which is 9% of the area under agricultural cultivation. Since Kyrgyzstan is a very mountainous country, the main water sources for irrigation are small mountain rivers within seven major river basins (Dj Ailoobayev, 2005).

Water reforms developed in synchrony with the relatively early, rapid and comprehensive land reforms (Ul Hassan et al., 2004; Lerman and Sedik, 2009). Towards the end of the Soviet era in 1988, 500 agricultural enterprises (collective and state farms) controlled the vast majority (98%) of the arable land. Smallholders (0.1 - 1 ha) produced on the remaining 2% of arable land. After the dissolution of the Soviet Union a radical land reform privatized most of the former collective and state farms (kolkhozes and sovkhozes). The individualization of farms was massive and by 2008 these farms produced 98% of the Gross Agricultural Output (Lerman and Sedik, 2009).

Irrigation systems greatly deteriorated because of a lack of O&M and financial means (Sehring, 2005; Gunchinmaa and Yakubov, 2010). Hence, under influence of donors such as the World Bank and ADB the Kyrgyz Republic adopted a new strategy and issued legislation on water and irrigation management, which introduced WUAs in a big way. The purpose was to "compensate for the disappearance of state and collective farms as water managers in the old on-farm system" (Ul Hassan et al., 2004:34). The first legal foundation of WUA was provided by the 1995 government decree "Regulations on WUAs in Rural Areas" and the 1997 "Statute of WUAs in Rural Areas". The latter regulates the transfer of on-farm infrastructure to WUAs, stipulates bookkeeping and fees, and enables the WUA to impose sanctions in the case of a breach of regulations. Based on these decrees the "Law on Water User Associations" in 2002 - provided the basis for WUAs to take over irrigation management and infrastructure development (Sehring, 2005; Kazbekov et al., 2009).

Since the mid-nineties, WUAs were established at the local level to distribute water, maintain field channels, and to collect the newly introduced irrigation service fees (ISF). The level at which WUAs operate often corresponds with or is related to that of the former collective farms. The transfer of irrigation management to the users aimed to make it market-oriented (through cost-recovering fees, demand orientation, less state interference and more efficiency) and democratic (through decentralization, user participation and empowerment). The main functions of a WUA are O&M of the on-farm (secondary level) irrigation system, water distribution, dispute resolution and self-financing of these tasks. A WUA is headed by an elected council (usually 7-11 members) with a chairman (or chair-woman), who all work in an honorary capacity. To get officially registered, the WUA needs to present a statute, article of agreement, the minutes of the general assembly, and the chart of the irrigation system.

However, the institutional reforms produced an institutional vacuum. The capacity of WUAs for O&M is only slowly emerging (Ul Hassan et al., 2004). Under influence of donors, the government wants that WUAs expand their role to the secondary level, but currently O&M is still mostly the responsibility of the government apparatus.

Tajikistan is also an extremely mountainous country. The primary sources of water for Tajikistan's rivers are the glaciers in the Pamir and Alay mountains. The irrigated land increased to nearly 750,000 ha in 2006, which represented about 5.3% of the agricultural lands (143,100 km2). Irrigated agriculture is mainly concentrated in four valleys (the Ferghana Valley, the broad Khatlon lowlands in the south-west, the Gissar Valley, Zeravshan Valley) (Lerman and Sedik, 2008).

Land reforms in Tajikistan followed a very moderate pace partly because of the civil war (1992-93). However, afterwards the process took a few years while reforms in Uzbekistan and Turkmenistan took as long as a decade. In addition, the number of private farms has not increased after the independence. The Water Code, adopted in 1993, and renewed in 2000, addressed some of the legal aspects of WUA establishment (Gunchinmaa and Yakubov, 2010).

Uzbekistan has 4.2 million hectares of irrigated land (World Bank, 2005). Approximately 82% of its agricultural water needs are met by water from Tajikistan and Kyrgyzstan, especially through the two trans-boundary rivers Amu Darya and Syr Darya (Rakhmatullaev et al., 2011). Uzbekistan is thus hugely dependent on these upstream countries, as the current conflict with

Tajikistan illustrates. This country aims to build the Rogun dam for producing hydropower on a major tributary of the Amu Darya, a main source of water for Uzbekistan. According to some this could become “the first water war of the 21st century. This water and energy conflict occurs at the border of the former Soviet Union, in a triangle of contested geo-political influence involving three world powers.

After its independence, the country underwent a series of land reforms which also determined the pace of water reforms. Soviet farms were first transformed into collective farms which, in turn, were transformed into semi-cooperative *shirkat* farms at the end of 1990s. The reforms continued and the *shirkat* farms were gradually transformed into and privatized to individual farming enterprises (Spoor, 2004). The land reform initiated in 1996, established a framework for Water Users Associations. Uzbekistan privatized unprofitable collective farms in 2000 (Wegerich, 2002). In general, land reforms have resulted in a complex land and water management situation, because a small number of collective or state (cotton and wheat) farms along the main canals, disintegrated into a mosaic of different types of farms: shirkats, private family-based farm units, pudrats (family contractions on shirkats) and dekhans (peasant households with small plots) (Veldwisch, 2007). In some cases these farmers started cultivating different irrigation intensive crops, such as rice, wheat and vegetables (Abdullaev et al., 2009), although the state continued to exercise a degree of control over crop planning. The Water Users Associations that were established as non-governmental and non-profit organizations at the canal level, had to deal with this increased complexity of water supply. Water that was managed and optimised before at the collective farm level, now had to be shared among many smaller enterprises within the WUAs (Veldwisch, 2007). Most of these WUAs were established in the 2003–2006 period and now play an important role in the allocation and distribution of irrigation water, the maintenance of the irrigation infrastructure and the collection of ISF (Abdullaev et al., 2008).

3.2 Middle East

In **Egypt** 3.4 million hectares of agricultural land are irrigated but, generally with 2 or 3 cropping seasons each year. The Nile River is the principal fresh water resource (Egypt’s official water quota is 55.5 billion m3/year), serving mainly the Nile Valley and the Delta. The second water resource is groundwater with two main aquifers (the Valley and Delta aquifer and the Nubian Sandstone non-renewable aquifer located in the Western Desert). Cultivated lands are classified into two categories: Old Lands, located along the Nile Valley and Delta regions, and New Lands, located west and east of the Delta, in the Sinai and oases.

Historically, the **Egyptian** state has assumed the responsibility of water delivery down to the level of the branch canal, and delegated to farmers control of management and distribution at the tertiary level canals, known as *Mesqa*, a farmer’s private property by law (Abdel-Aziz, 2003; Mahmoud 2005). Given the long history of irrigated agriculture in Egypt, a number of traditional forms of farmer participation (*munawaba* and *mtarafs* system, the *saqia* ring for collective pumping of water, etc) provide a good background for establishing formal private water user associations (Abdel-Aziz, 2003). Thus, the Ministry of Water Resources and Irrigation (MWRI) has adopted a policy to encourage farmers to play a more important role in irrigation management and related water services, with the additional objective to shift a part of costs of O&M onto farmers, in order to improve the O&M of irrigation and drainage systems, equity of irrigation supply and the resolution of conflicts among users.

The first attempts of establishing formal WUAs were led by the MWRI in the late 80s early 90s under the USAID funded projects, the Egypt Water Use and Management project (EWUP), Irrigation Management Systems (IMS) project, and the Irrigation Improvement Projects (IIP) (El-Sharkawy et al., 2006). In 1994, the government of Egypt issued the Law 213 providing the

legal framework for WUAs, 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'. WUAs were responsible for operating and maintaining the "improved mesqas", that included single-point lift pumping stations, introduced by the IIP project (and its successor, the IIIMP) (Batt and Merkley, 2010). The same law also introduced the Water Users Unions, (WUUs) which are applicable for the New Lands (Attia, 2004; Hassabou and El-Gafy, 2007). Water users associations have managerial, financial, and technical autonomy. They make their own budget and set the tariff for irrigation (Hassabou and El-Gafy, 2007).

USAID was also instrumental in fostering the establishment of branch canal water user association (BC-WUAs) at the secondary level and, while the Dutch Cooperation promoted water boards (WBs) at both the branch canal and district levels (Ezzat El-Agha, 2010). About 600 BCWUAs have been established, covering 15% of Egypt's irrigated area and involving half a million farmers and residents (El-Sharkawy et al., 2006). But in practice, BCWBs lack legal sanction for their roles and have had few real responsibilities to implement. Their role has been limited to that of an advisory body to MWRI and other government agencies. It is not clear how the BCWBs would fund themselves once project benefits are gone (Svendsen et al., 2003).

In **Syria** irrigated land represents 1.37 million hectares, which is almost 10% of its total agricultural area. Its agricultural landscape is still dominated by rain-fed lands. In the 1940s and 1950s the irrigated area expanded with the introduction of machinery and pumps. The irrigated area doubled around 1978 with the Euphrates Dam, and the expansion of irrigated land in the Euphrates Valley and adjacent lands. Aside from the Euphrates, the bulk of irrigation is found is the Orontes (Homs/Hama), Barada (near Damascus) and Quaick (near Aleppo) river valleys. In addition to public networks in main valleys, springs, small rivers and private wells are used for irrigation (Sadiddin and Atiya, 2009), with groundwater supplying 60% of the total irrigated area (Aquastat).

The experience with formal water user associations (WUAs) in **Syria** is limited in spite of some early experiences with collective farm and water management. In the early 1930s the Deir Atyah associations (near Damascus) was credited with encouraging other village farmers to establish cooperative community associations for the utilization of water resources in irrigation in other governorates (Kaisi and Yasser, 2004). Since 1969 the government promoted what it called a participatory system of association management (Kaisi and Yasser, 2004). Recently, the government has adopted a range of measures and polices, aiming at the sustainable development of water resources and the establishment of WUAs, as well as the activation of existing ones. The Presidential Resolution no 31 of the 6 November 2005 defines in its eleventh chapter the WUAs, their responsibilities and the process to be followed for their formation. No literature was found on whether these WUAs are performing or not, and what they really do.

In **Jordan**, roughly 100,000 ha, or 10% of almost a million hectares of agricultural lands, is irrigated, one third on the highlands (with groundwater), and two thirds in the Jordan and lateral valleys (mostly with water from the Yarmouk and small side-wadis). Large-scale water development in the Jordan Valley is publicly managed, whereas small-scale systems are the initiative of farmers. Large-scale water resources development in the Jordan Valley started in the 1960s and led to a centralized system of water management under the Jordan Valley Authority (JVA) of the Ministry of Water and Irrigation (MWI) (Regner et al., 2006). Currently, one-third of Jordan's irrigated areas, approximately 30.000 hectares, falls under its jurisdiction. The JVA is a government organization in charge of the operation and maintenance of the irrigation system but also has the responsibility for economic and social development in the Jordan Valley (Salman et al., 2008). The Jordan Valley irrigation scheme includes 53 development areas distributed along the valley. These areas are usually fed by one common source of water, which can either be one of the 28 collective pumping stations sourcing water

from the King Abdullah Canal that flows through the valley, a *wadi* or a dam (Salman et al., 2008). Water is conveyed from this source to farmers' fields through a pressurized pipe network covering 400-500 ha, and distributed to each farm unit.

Although springs and wadis have always been managed through farmers' cooperation, formal water users associations (WUA) did not exist in Jordan (Salman et al., 2008). In the 2000s, the French cooperation supported participatory projects to improve pressurized network efficiency and water management, which included the establishment of WUAs. According to Mazahreh et al. (2004) the technical improvements were successful and well received, but the transfer of irrigation management to WUAs was somehow rejected. The farmers did not sustain their participation after the project interventions had ceased.

Nevertheless, decentralisation and privatization, and support to retailing of water by WUAs featured as main objectives in the Water Strategy of Jordan 2008-2022 called, "Water for Life", (GoJ, 2009):

Under the new structural reform, we will have one organisation responsible for bulk water supply in the Jordan Valley. Farmers associations will be formed and empowered to handle retail water. For this purpose appropriate legislation will be introduced.

Over time, we will redefine the role of the new institution responsible for irrigation in the Jordan Valley to focus on regulation and supervision of services. Involvement of stakeholders and the private sector in irrigation management shall be introduced and gradually promoted. Care will be taken to monitor and supervise the use and distribution of water resources in that regard.

The French technical cooperation (focused on network rehabilitation) and GIZ jointly contributed to bringing significant changes in the valley in recent years. WUAs have been established over 80% of the irrigated area in the valley and half of them have entered in contractual arrangements with the Jordan Valley Authority (JVA), whereby they take over the responsibility of Operation and Maintenance in the area served by their collective pumping stations. WUAs are currently organized under the Cooperative Law but a new by-law has been under consideration for several years to give full recognition to WUAs. This by-law defines the rights and duties of WUAs and governmental partners, but has not been passed yet.

In **Lebanon**, the irrigated area of 139,746 ha amounts to almost 20% of the agricultural land. Roughly 2/3 is under gravity irrigation and 1/3 under pressurized systems. Groundwater supplies about half of the irrigated area. Lebanon has 17 main rivers, 2,000 springs; and 50,650 wells, but only two major dams: Qaraoun Dam in the Bekaa valley and Chabrouh Dam near Mount Lebanon.

Formally governed through the Ottoman Majallah Code of 1877 and later through the French Civil Code during the Mandate period (Gharios, 2009), water was managed in a tension between central governments and local powers (Ghiotti and Riachi, 2012). After the civil war of the 1980s, Local Irrigation Committees were established. These gained some financial and managerial independence, but remained under the tutelage of the Ministry of Energy and Water (MEW) (Comair, 2007). In general, these committees had a very limited role in the operation, maintenance, rehabilitation and renovation of the irrigation infrastructure and equipment (Gharios, 2009). In 2000, the Lebanese government launched a reform of the water sector with assistance from donors such as the World Bank and AFD (Agence Française de Développement). It adopted a water master plan together with a series of laws and decrees. The stated aim was to improve water resources management through the implementation of Integrated Water Resources Management (IWRM). Reforms included a proposal for the implementation of WUAs in small and medium schemes and the establishment of four new regional Water Establishments to manage water resources in the place of the 22 existing Autonomous Water Offices (AWOs) and 209 Local Committees, including 128 devoted to communal irrigation (Comair, 2007). These establishments are in the process of aggregating

local water committees (formed for domestic water purposes), which seems to go against decentralization and co-management (Alles and Puig, 2012). According to Comair (2007), 25 of the irrigation Local Committees "efficiently undertake O&M tasks". The few existing (irrigation) WUAs are generally agricultural cooperatives that provide various services to farmers or have been set by aid and development projects without clear legal status (Gharios, 2009). Most manage communal systems, except the one set in 2003 in Canal 900 area, the 600 ha scheme managed by the Litany River Authority. This WUA never really worked, was unsuccessfully revived in 2006, and how to organize farmers is currently again under consideration by an USAID-funded project (Nassif, 2012).

Palestine has 16,920 hectares of irrigated area, which is 5% of the total agricultural land (367,822ha). Water supply decisions are taken by the Israeli state. Local municipalities and Regional Water Utilities (RWU) that were established during the Palestinian water reform in 2004 are responsible for local networked supply. The private sector plays an important role in providing service from septic tanks and drinking water by tankers. The few community-based water associations and village user councils that were established to represent end users, pay full cost of domestic water and subsidized cost of irrigation, but without any input to water supply or demand decisions (Empowers Country Teams, 2007). WUAs have been established especially to improve the efficiency of irrigation with support from donors in the West Bank and Gaza.

3.3 Yemen and Sudan

Yemen has a long tradition of farmer-managed rain-fed and irrigated agriculture. Rain-fed agriculture is important in its farming systems with 45% of the irrigated area, but 40% are under tube-well irrigation and the remaining 15% under spate and spring-fed irrigation (Atroosh, 2006). Community-managed irrigation and rights systems have traditionally governed the access to land and water.

The centralization of water management started from the 1970s onwards with the construction of large-scale water infrastructure in main wadis (Lawrence and van Steenbergen, 2005). From the early 1980s, the responsibility for the O&M was adopted by the irrigation section of the Ministry of Agriculture. In 1996, the Governor of Lahej and the Ministry of Agriculture issued Resolution 14/1996 and Decree 7/1996, which re-established the regional Irrigation Councils already created in 1967 after creation of independent South Yemen. The Irrigation Council comprises the District Commissioner as Chairman, the Director of Agriculture as Deputy Chairman, the Director of Irrigation as Secretary and 14 farmer representatives -who are permanently appointed- as members. In its consultative and advisory role, the Irrigation council discusses and approves irrigation plans as proposed by the Director of the Regional Agricultural Office. It also decides on the distribution of floods and assists in the management and maintenance of the irrigation structures (Lawrence and van Steenbergen, 2005).

Decentralization often implies the centralization of planning and the decentralization of implementation (Attia, 2003). The Local Authorities Law (No. 4/2000) empowered local water authorities with greater administrative, managerial and fiscal responsibilities. However, within this new formal system it is not clear who is in charge of the management of spate irrigation systems (e.g. in Wadi Tuban) (Lawrence and van Steenbergen, 2005).

A policy trend towards decentralized water management was reinforced but retained weaknesses. The 2001 Law No. 1 on Nongovernment Organizations and Societies establishes the legal status of WUAs. The local council has formal ownership of infrastructure, provides support and helps improving WUA performance. The registration of a formal WUA offers some advantages in terms of banking, formal accountability mechanisms, supervised elections,

reporting, audits, etc. However, the registration procedure is complicated and requires going through an elaborate series of procedures. In addition, the legal status is not sufficient to make and enforce rules of water use, maintenance, fees and other matters over all users of the water resources (Bruns and Taher, 2009). WUAs are responsible for irrigation management according to the existing water rights along with settling disputes, participation in preparation of irrigation plans, fee collection for O&M expenditures.

In Yemen, the Water Law was issued in July 2002. It contains the basis for setting up new organizations in water management: Water Basin Committees, Water Zone Committees (for parts of the basins) and Water Users Associations as well as federations and unions of WUAs. The Water Law does not describe the power given to these new bodies and the procedures for their establishment, but it refers to a forthcoming bylaw that has eventually only been passed in 2011. In the meantime around 700 WUAs have been formed – often registered under Law 39/ 1998 or Law 12001/ on Cooperative Societies and Associations – and frequently in the framework of aid/development projects. This, however, does not grant them authority to make and enforce rules and manage local water (Bruns and Taher, 2009). According to van Steenbergen et al. (2012), "*the status of the 700 WUAs formed in the last decade is unknown and an inventory would be important. Anecdotal evidence suggests that many WUAs have withered after the intensive engagement in the concerned project was over"*.

In **Sudan**, the irrigated land is estimated at 1.71 million hectares, 93% of which under government projects; the remaining 7% belonged to private operations. The Nile and its tributaries are the main source of irrigation water (93%), with two thirds served by gravity and one third using pumps. Spate irrigation contributes about 3% of the country's irrigated area. Flood irrigation contributes with about 2% of the irrigated area, mainly along the Nile and mostly supplemented by ground water with small pumps (Ahmed, 2005).

Although the Ministry of Irrigation and Water Resources (MOIWR) was responsible for the O&M of irrigation infrastructure in Sudan, farmer participation was not entirely a new idea in irrigation management. Since the early nineties the government has adopted neoliberal measures to reduce subsidies, promote cost sharing and fee collection, and encourage a more active role for water users in O&M of the irrigation infrastructure (Eldaw and Ahmed, 2004). This started in the Gezira Scheme.

Gezira is the largest gravity irrigation system of the African continent. It covers about half of the irrigated area in Sudan and uses water from the Nile (Adam, 2003). In the Gezira scheme the responsibility of the MIOWR included the O&M of the whole system from the Sennar dam to the off-take of the tertiary canals feeding the fields. O&M responsibility of the lower system was done by the Sudan Gezira Board (SGB) and the tenants were responsible for the O&M of the field canals irrigating their fields. Under the umbrella of rehabilitation and modernization and with World Bank support, the FAO experimented with WUAs and promoted reforms in the Abdel Hakam Pilot Project from 2000 onwards. This pilot project was reported to be a success and recommended for replication (Abdelhadi et al., 2004).

With the Gezira Act of 2005, the tertiary level of the Gezira Scheme was turned over to the water users (Woldegebriel, 2011; Mathot, 2011). Farmers who were organized in WUAs became responsible for O&M, fee collection and crop rotations. However, these decentralizing tendencies in the management were followed by a more recent policy turn. In 2010, a policy declaration was signed that transferred the control over water from the old Gezira Board to a new Gezira Scheme Management Body (Mathot, 2011). This implied a huge loss in public jobs at the MIOWR and the SGB. O&M responsibilities that belonged before to the MIOWR and the SGB were devolved to the new Management Body and contracted out to private security and earth moving companies. Since these companies had no experience with the distribution of water at the field level they re-employed ghaffirs (canal operators) who had gained experience with this job before. This represents a degree of continuity in the daily water distribution of a

relatively flexible irrigation system (van der Zaag and Rap, 2012). For maintenance purposes, the earth moving companies' supervisors instruct the machine workers, WUAs or informal farmer groups mobilize labour or pay a machine worker for the excavation of canals. At times, the security companies also appear to be involved in fee collection together with the WUAs.

3.4 Turkey

Turkey has an irrigated area of 5.29 million hectares, that is, 13% of its agricultural area. Most of its larger irrigation projects are concentrated in the coastal regions of the Aegean and Mediterranean Seas. However, the GAP Project, located in Southeast Anatolia (Güneydogu Anadolu Projesi), is a huge regional development project that irrigates around 1.7 million hectares in the upper Euphrates and Tigris basins. The country also includes around 1.3 million ha of small-scale irrigation schemes and 1 million ha of private irrigation schemes.

The Turkish state was unified under Mustafa Kemal Atatürk, after the decline of the Ottoman Empire and the Independence War (1919-1922) that followed the First World War. It opted for a centralized approach to water resources and infrastructure under the responsibility of a bureaucratic agency (DSI: State Hydraulic Works) which was established in 1954. Large water infrastructure was central to building the state and therefore centrally planned, constructed and managed by this government agency, which was modelled after the Bureau of Reclamation (Kadirbeyoğlu and Özertan, 2011). Nevertheless, already from the 1950s onwards, legal provisions (Law 6200, article 2,subclause k) did allow for the transfer of small-scale, marginal and difficult-to-manage public systems to irrigation groups, at the modest annual rate of about 2,000 hectares (Burak, 2005; Svendsen and Nott, 2000; Yercan et al, 2004). However, central government officials were reluctant to decentralize larger irrigation systems out of concern for losing control of the management (Vidal et al., 2001).

This modest rate of transfer radically changed around 1993, when the government adopted the PIM policy and accelerated the rate of transfer sharply. The IMT policy and the establishment of WUAs fulfilled a prerequisite for new loan allocations to the water sector and realised a set of (neoliberal) economic expectations (Burak, 2005; Kibaroglu et al., 2009; Özerol et al. 2013). The policy coincided with a great economic need to reduce public expenditure in order to get new loans, which explains the receptiveness of government officials for new policy ideas. The World Bank persuaded the government that a substantial transfer of its large irrigation infrastructure was necessary and could be successful. Key in the World Bank's catalytic role and part of the loan package was to invite more than 50 senior officials to the Mexico and USA. Mexico at that time had also accelerated its transfer and the visitors were shown examples of WUAs that had actually taken over the management of large and medium scale irrigation systems. This success encouraged the DSI staff to adopt the Mexican model, pursue an ambitious program of accelerated transfer and select a number of four pilot projects where conditions were favourable to get the process going (Murray-Rust and Svendsen, 2001; Döker, 2003; Tekinel, 2004; Kodal et al., 2005; Rap, 2006). From 1994 onwards, the annual amount of land transferred in Turkey increased dramatically and surpassed the DSI's original action plan (Tekinel, 2004; Yercan et al., 2004). This 'Big Bang' approach was much appreciated by the World Bank, which decided to make Turkey a model country (Tekinel, 2004) and an example of a successful IMT programme (Vermillion, 2000, Murray-Rust and Svendsen, 2001; Vidal et al., 2001). The PIM programme resulted in the transfer of around 95% of the irrigation infrastructure to users organizations by 2005 (Uysal and Atiş, 2010).

According to the literature there were three main drivers for PIM in Turkey. First, the rising costs of public irrigation management that the government could no longer afford. The increasing O&M costs posed a heavy financial burden on the government, as these expenses were not recovered because of very low fee collection rates among the beneficiaries (Döker et al., 2003).

Structural adjustment policies of the IMF and a national budgetary crisis necessitated the reduction of the public expenditure on irrigation management. The limitations on financial allocations to DSI and the O&M department also led to deferred maintenance and the deterioration of irrigation infrastructure (Svendsen and Nott, 2000; Kibaroglu et al., 2009). Second, the neoliberal policies of privatization, liberalisation and commercialization were strongly promoted by the Turkish government and international agencies for all economic sectors. Third, farmer participation was expected to increase the efficiency and productivity of irrigation and sustainability of irrigation facilities (Murray-Rust and Svendsen, 2001; Yercan, 2003).

Different organizational forms were given to the newly created water user organizations under different laws. In 2012, Irrigation Associations (IAs) managed by far the largest part (90%) of the totally transferred area, 3.21 million hectares (DSI, 2012[4]). Larger irrigation systems cover several villages or municipalities and therefore the IAs were formed as overarching local administrative unions that encompassed multiple jurisdictions under the Municipal Law. However, IAs were not the only possible form of user organization, because also cooperatives (5%; Cooperative Law), municipalities (3%) and village legal entities (2%; Village Law) were made responsible for managing local irrigation systems. Local leaders such as village headmen (*muhtars*) or mayors of municipalities often became the heads of these user organizations (all called IAs below). This shows that the transfer depended partly on already existing organizational and legal structures and local authorities.

With support from the World Bank, DSI remained the main initiator, executor and supervisor of the transfer program (Kibaroglu et al., 2009). It was undertaken entirely with existing DSI staff and was implemented in the field by regional O&M personnel acting as promotors. Extensive training and orientation programs were held to acquaint field personnel with the program's approach. At every transfer, a transfer agreement and protocol were signed between the DSI and the IA, which specified the transfer of management responsibilities. In addition, the bylaws of the IAs stated that the IAs became responsible for distributing water below the secondary canal, maintaining canal infrastructure and collecting fees in this zone (Yazar et al., 2006; Kadirbeyoğlu, 2008). In all cases, the ownership of the infrastructure, the maintenance machinery, and the water rights remained with DSI and the Turkish state. After transfer, DSI managed bulk water allocations and the primary canal infrastructure, IAs managed the secondary network up to the tertiary intakes and informally organized groups of water users controlled water distribution within the tertiary units (Kibaroglu et al., 2009).

Hence, the legal framework clearly demarcated the rights and responsibilities of the IAs (Yercan et al., 2004; Uysal and Atiş, 2010), but did not always clearly specify **the-transfer-of-what** exactly the state committed to. For example, in the present circumstance, IAs identify the total water demand at the start of the season for the DSI, which then allocates the amount of water from the reservoirs (Kadirbeyoğlu, 2008). "DSI has ultimate control of bulk water deliveries by virtue of its control over reservoir operations" (Kodal et al., 2005). The transfer agreements fail to specify the bulk allocation or water entitlement of individual IAs and also the exact details and conditions of the operation, maintenance and administrative facilities that were transferred (Dadaser-Celik et al., 2008; Kukul et al., 2008; Kibaroglu et al., 2009).

The IAs were set up by local authorities with DSI support (Kadirbeyoğlu and Özertan, 2011). The General Assemblee of the IA is composed of municipal and village leaders (*muhtars*) and democratically elected members of municipal authorities within the irrigation system. For the governing body they elect a chairman and four executive committee members. Together with an assigned manager (an agricultural engineer) and an accountant, the body consists of seven

[4] *www.dsi.gov.tr/hizmet-alanlari/tarim*

members (Tekinel, 2004). At every regular general assembly, which consists of local authorities, the chairman and the board of directors present their account for approval and the technical and managerial issues are discussed for water tariff setting. IAs are non-profit organizations which cover areas ranging from 300 up to 35 000 hectares. If an irrigation system serves more than one region or village, it is generally transferred to the IAs formed by the municipalities of these villages (Tekinel, 2004). The most striking feature of these original legal provisions and organizational structure for the IAs is that there was no direct water user representation in the transfer process and the irrigation management. Their only recourse was the five yearly elections of muhtars (Kibaroglu et al., 2009).

Several legal complications have influenced the formation of IAs. These user organizations were originally established in majority under the Municipal Law No. 1580. This legal solution was considered convenient although not entirely appropriate, because it made IAs accountable to the Ministry of Interior. This Ministry did not necessarily possess the appropriate technical expertise to supervise the IAs. DSI officials (and WUAs) started to regret this 'patchy legal foundations' (Kadirbeyoğlu and Özertan, 2011) and the plea for a new law, specific to make IAs sustainable, was frequently repeated in the literature (Vidal et al., 2001; Çakmak et al, 2004; Kadirbeyoğlu, 2008; Uysal and Atiş, 2010). Several drafts of this law were circulated, presented and discussed during the last decade or more. In 2001 a proposal was debated but not accepted. In 2005, the Local Administration Associations Law 5355 incorporated a special article 19 that specifically mentions the Irrigation Association for the first time in Turkish legal history (Özerol et al., 2013). The IAs acquired the status of local administration associations and remained under the Ministry of Interior. In March 2011 a new Irrigation Associations Law was finally enacted. Amongst others, this law reinstated DSI as the dominant public water authority that acts as an 'advisory and controlling institution' to IAs (Uysal and Atiş, 2010).[5]

3.5 North Africa

North African countries developed centralist and hierarchical policies for the coordination of the agricultural sector and the access to land and water resources. This choice led to a strong control of planning and management of agricultural activities by national states. They designed legal frameworks and public policies in the irrigation sector without much contribution from farmers' organizations (Errahj et al., 2009). In spite of the relatively high standards of water delivery technology, irrigation in the North African countries is not performing as expected (Plusquellec, 2002).

Tunisia irrigates 416,224 hectares, which is 4% of its total agricultural area. In 56% of the irrigated area (368,000 ha), irrigation infrastructure has been developed by the state. These areas are either managed by state agencies or by the farmers. Large-scale schemes are created below dams (125,000 ha). Medium and small-scale public schemes are organized around deep tube-wells (82,000 ha) or the re-use of treated sewage effluent (7,000 ha). Private small-scale systems manage shallow wells (140,000 ha), deep tube-wells (10,000 ha) or river diversions (10,000 ha) (Al Atiri, 2004).

Tunisia adopted a national strategy of decentralisation as part of the structural adjustment policies of 1986 (Al Atiri, 2003). In 1995, a national water saving strategy was implemented, especially to improve irrigation efficiency in collective irrigation schemes, including the rehabilitation and modernization of irrigation systems, the promotion of water saving technologies, laws, programmes and trainings, as well as information, decision support tools and extension techniques (Lebdi, 2006). The creation of and assistance to WUAs in running

[5] *We thank Gül Özerol for the information about the new law and several other issues.*

irrigation schemes was expected to increase awareness of water scarcity and the need for a rational use (Vidal et al., 2001).

Nevertheless, the involvement of farmers in water management has historical antecedents, all assisted by the state bureaucracy. In the 1920s, Collective Interest Associations (Association d'Intérêt Collectif, AIC) were developed for the management of irrigation water in the oasis of Zarzis (South Tunisia). In the middle of the 1980s, the regional branches of the Ministry of Agriculture (CRDA), with USAID support, re-activated the AIC to become a local body for water resources management. But the Ministry of Agriculture also re-activated "Groupements d'Intérêts Collectifs" (GIC), dating from the colonial era, to ensure the management of water resources.

The Law no 99-43 and its Decree no. 99-1819 both promulgated in 1999 introduced the new entity of the *Groupement de Développement Agricole* (GDA). The main stated objectives of the GDA were: natural resources preservation, agricultural works, provision of equipment, agricultural inputs, productivity improvement, technical advice, and marketing. The GDAs' income may include service fees, incomes form other activities and others (loans, subsidies, donations, etc.). Expenditures can be on O&M, administration of the GDA, reimbursement of loans and other expenditures.

In 2004, the Law 2004-24 transformed all the AICs and GICs into GDAs. These GDAs had to enter into a contract of operation with the CRDAs. In 2006, 1250 GDAs managed 200,000 ha or 75% of public irrigation schemes in Tunisia (MARH, 2008 cited by Frija et al., 2010). At the National level, a performance evaluation of GDAs suggests that 41% are good, 43% average and 16% weak (World Bank, 2008).

On paper, these new entities enjoy a large degree of autonomy from the government. GDAs are managed by an administrative council composed of three to nine members belonging to the association and elected by the general assembly for a total period of three years. The president of this administrative council is chosen from among these elected members. His main mission is to represent the interests of the GDA in its relationships with the public administration and other actors. He can also choose a technical director (according to the needs and the financial situation of the GDA) to ensure a closer follow-up of O&M tasks. Financial aspects of the GDAs are dealt with by a treasurer, appointed on the recommendation of the administrative council and approved by the governor. Accounts are controlled by a regional financial agent from the Ministry of Finance (Frija, 2009). Each GDA is responsible for setting its own budget, defining water and other fee to cover the running costs of the GDA.

However in practice, the administrative council is usually appointed in agreement with the local government and contributed to the political propaganda and financial support of the then ruling party (Mouri and Marlet, 2007). Consequently, most GDAs are dominated by local or higher-level political powers, which tends to undermine their legitimacy and make them ineffective (see Case study, Vol. 2). In addition, GDAs are under the bureaucratic supervision of the Ministry of Agriculture, Ministry of Finance, and Ministry of Interior, which makes their operation a difficult task (Chennoufi, 2008).

The successive institutional changes from AIC to GIC and then to GDA were not necessarily enshrined in a legal framework. Nevertheless, some GDAs have inherited debts from the earlier forms of association and others have received a degraded infrastructure. Further, farmers have not been involved in the process of institutional changes. In spite of the transfer to farmers' organizations and involvement of farmers in decision-making, the central administration and political institutions still dominate the organizational landscape. In the Tunisian legal framework roles and responsibilities of WUAs seemed to be oversized, whereas the state's role –however dominant it remains- is not clearly defined.

In **Algeria**, the area under irrigation covers 865,286 hectares (i;e. 2% of its agricultural area), with a predominance of medium and small-scale schemes (88% of the area). These systems were partially or entirely created by farmers using surface wells, deep tube wells, small reservoirs, wadis (spate irrigation systems), springs, ghotts (small oases in the South) (Mouhouche and Guemraoui, n.d.). Large scale schemes were constructed and are fully managed by the state.

Algeria has a legacy of state-managed and collective farms. After the dissolution of the socialist state-managed farms, the land reform of 1987 created collective farms (Agricultural Exploitation Collectives or EACs) on public land under the law 87-19 (Errahj et al., 2009; Imache et al., 2009a). Water reforms have only slowly followed this land reform. In 2005 the Law n° 05-12 included representatives of the different user categories in the management of irrigation schemes and served as an umbrella to develop WUAs (This law did not clearly state the legal status of WUAs, but was later flexibly appropriated to form WUAs). The main purpose of these WUAs was to support the management, use and protection of water resources within their area of responsibility. Since 2006, a monitoring committee in each large scale system promoted Participatory Irrigation Management. In small scale systems, the state currently imposes the formation of a WUA before any state intervention on the hydraulic infrastructure can take place (Belkateb, 2012). In Algeria the active participation of WUAs in water management still remains at an embryonic stage (for more details see Amichi, 2009; Imache et al., 2009a and b).

Morocco irrigates 1.32 million hectares, which corresponds to 4.4% of its agricultural area. Gravity irrigation is the most widespread method (81%), while sprinkler irrigation (10%) and micro-irrigation (9%) slowly expand. The latter technique is mostly found in private systems. Large-scale schemes have been constructed and managed by the state and dominate the irrigation landscape with 682,600 ha. These systems are usually fed by dams. The state also sometime assisted in constructing or renovating medium and small schemes (334,130 ha) that are managed together with the water users. The sources of supply include small dams, springs, qanats (*khetaras*), tube wells, weirs for spate irrigation. Many communal systems with a long history are, however, managed based on collective rules and local management. Private schemes (441,430 ha) are developed and managed by individual farmers or private companies (MADRPM, 2007).

In 1968, the state launched an irrigation programme with the goal of attaining 1 million hectares of irrigated land by 2000 (Bergh, 2007). This programme was based on irrigation development that was planned, constructed and managed unilaterally by the State. After the adoption of structural adjustment policies in 1983 and economic liberalization, the government started to explicitly call for involvement and empowerment of users in water management (van Vuren et al., 2004; Bergh, 2007). The compulsory and fixed cropping pattern was liberalised and a kind of on-request water delivery was introduced. The government introduced the PIM policy in 1990 and advocated the progressive involvement and empowerment of users in water management in 1995. The 1990 Law no 02-84 specified the legal status of WUA and named them 'Association d'Usagers de l'Eau Agricole' (AUEA). The 1992 Decree no 2-84-106 fixes the terms of agreement between the government and the AUEAs. They became responsible for irrigation management, water works, O&M of infrastructure and fee collection within their (tertiary areas). Almost all medium and small public schemes in Morocco are presently fully managed by AUEAs (Garces-Restrepo et al., 2007). In most large-scale public irrigation systems however, the AUEAs have remained weak (Haouz, Tadla), or non-existent (other schemes) (Faysse et al., 2010).

AUEAs are not granted specific water rights or ownership of the irrigation infrastructure. The AUEA General Assembly elects six out of a total of seven members of the council (*conseil)*, the remaining so-called 'seventh member' being a government representative. The council is responsible for preparing the annual budget of the WUA and for implementing the decisions

taken by the General Assembly (Garces-Restrepo et al., 2007). However in practice, the irrigation agencies controlled the formation of many AUEAs and incorporated local *notables* (elites) in the administration of rural areas, while in exchange, these rural elites provided political support to the central administration (Leveau, 1985 cited by Faysse et al., 2010).

3.6 Conclusion

IMT and PIM policies were part of structural reforms of national states that were introduced at the end of the Cold War, in the aftermath of the disintegration of the Soviet Union. The political and economic crisis at that time paved the way for neoliberal transformations aimed at 'rolling back the state' (Kibaroglu et al., 2009). These reforms were directed at reducing the state and bureaucratic dominance in the economy that was developed over half a century under the centralized planning systems of communist and developmental states during the post-war era.

Structural Adjustment programs designed to transform national economies in a neoliberal fashion prompted governments to reduce state expenditure, in particular in the costly public irrigation and water management sectors. This called for the "participation" of non-state actors or 'water users' in the financing and organization of water management. These water users were mainly conceived to be farmers, since the agricultural sector was the main consumer of nations' water resources. These strong economic motivations were accompanied by an equally strong belief among international donors that the participation of water users could increase the efficiency, productivity and sustainability of irrigation systems and empower water users.

Since neoliberal policies to reduce state expenditure and increase cost recovery were applied in a top-down manner, it is not surprising that the participation of water users was especially valued in terms of cost-recovery and of taking-over expensive tasks that were formerly carried out by public water institutions. The promotion of user participation and empowerment to improve irrigation performance, however, played a useful role in persuading government officials and water users that this was a positive change and more than just a cost-cutting operation. The IMT/PIM policy discourse thus combined a remarkable mixture of pragmatic material needs with ideological fervour.

International banks and donors played a major role in promoting IMT/PIM policies, but also international organizations such as FAO and IFAD played a supportive role in the formalization of WUAs. In several cases, these water reforms were part of a conditional loan package. To what extent domestic actors adopted and responded to these reforms varies from country to country. But it is clear that these policies were to a large extent conceptualised and promoted at the international and national levels. The relative top-down nature of water user organization formation, within the state's requirements, becomes obvious when studying policies in detail. First, although IMT/PIM policies and the accompanying legal framework and contractual agreements usually demarcate the rights and responsibilities of WUAs, they do not always specify **what** the state actually 'transfers'. Second, it is striking that in the policy process of formulating and implementing IMT/PIM the participation of water users was often lacking. For example, the definition of what organizational form a WUA takes was more a bureaucratic decision than based on water users' opinions or preferences. The case of Turkey showed that the water bureaucracy secured being the main authority in control of these issues.

In the ex-Soviet Union and other states with a statist and collective forms of land tenure (e.g, Algeria or Syria), land reforms were often setting the tone and pace for water reforms. The rate and pace with which national governments, with the support of international agencies, dismantled the state-led system of irrigated production varied substantially. This also influenced the extent to which water reforms and the transfer of irrigation management to WUAs was hampered by the ongoing land reforms. In a country like Kyrgyzstan, land became fragmented

into small subsistence farms, which greatly complicates water management. Land fragmentation multiplied the individual demands and crop choices, making water distribution hugely complex and the financial basis of WUAs very meagre. Uzbekistan chose for a different model in which land was distributed to a relatively smaller number of larger private farms that were encased at a collective level and the state kept a degree of control over crop choice. This facilitated water management to some extent, as it is easier to distribute water to a more limited number of farms, however it excluded a large part of the population from the access to land and water. In reality there exists a diversity of water management situations that WUAs face within these countries.

4 Community-managed irrigation and sustainability

4.1 Introduction

The Middle East and Northern Africa region is famous for its longstanding experience with water systems managed by communities or farmer groups. In arid and semi arid regions any local source of water - a spring or a well - is the key to the life of communities and therefore also a source of collective action to allocate that water and maintain its source.

Community- or farmer-managed irrigation systems are considered to be endowed with 'social capital'. This 'refers to those stocks of social trust, norms, and networks that people can draw upon to solve common problems' (Pradhan, 2002a). A history of self-organization in community-managed irrigation demonstrates that farmers have the desire and ability to develop functional self-sustaining norms of collective action in order to manage the allocation and distribution of a common water resource. Communities developed customary rules on how to schedule irrigation and divide the water, collectively maintain the water source and water ways, and manage irrigation themselves. These customary systems of rights and rules governed access to land and water and helped to resolve conflict. Often these systems were characterized by the existence of strong leadership and clear rules for 'equitable' water distribution, especially under scarcity conditions.

While irrigated agriculture continued to provide substantial benefits to local communities, state institutions and development practitioners argued that these systems were declining and facing sustainability concerns. Since the late 1970s, international development agencies started to fund technical projects by state organizations to rehabilitate and modernize these communal schemes. Such governmental interventions are generally legitimized by the claim to 'modernize' traditional systems, introduce sophisticated 'technologies', improve 'efficiency', increase agricultural production and farmers' income (Coward, 1985). However, many of these modernization efforts produced negative effects for the social organization and local governance of water resources.

These ideas on community- and farmer-managed irrigation systems (FMIS) were very influential and inspiring in the emergence of PIM and IMT policies. The reasoning was that if water users could sustain small-scale irrigation systems then why not also larger systems. This reinforced a belief that Water Users' Associations would constitute a more local, democratic, and rational form of management.

We have divided this review according to four types of community-based irrigation commonly found in the NEN region: spate irrigation; spring and deep wells; qanats and other cases. We then examine patterns of state intervention in these systems and attempt to identify some commonalities, conditions and factors for successful resource management.

4.2 Community-managed irrigation systems and emerging problems

4.2.1 Spate irrigation

Spate irrigation is the diversion of water from fast-flowing torrential streams by (often temporary) weirs onto farmers' fields for the purpose of irrigation. This is a common and ancient technique of farmer communities in arid and semi-arid regions to cope with the unpredictable and heavy rainfall and to control floodwater of *wadis* in a sustainable manner. Spate irrigation has been developed by communities especially in Yemen, Algeria, Morocco, Jordan, central Tunisia and

Sudan. In fact, spate irrigation systems account for approximately 20% of the irrigated area in Algeria and Yemen, 13% in Morocco, 8% in Tunisia and 2.5% in Sudan (Perry and Bucknall, 2009). In these countries farmers reshaped the landscape with ditches, terraces and bunds to control and guide surface flows to their fields.

How communities manage water for spate irrigation is impossible to understand without the concept of *Aurf*. This encompasses a collective and customary rights system of Arabic origin, based on Islamic law, but usually unwritten and passed on through oral tradition from one generation to the other. This customary system of spate irrigation raises some power and equity issues associated with collective action, such as upstream/downstream problems (e.g. in Yemen, priority is given to upstream users; Bahamish, 2004; Bruns and Taher, 2009), water conflicts among farmers and the dominance of local elites.

The power and responsibility of managing communal systems in Yemen – on tributaries and small streams – is given to water masters or *Sheikhs* (Bahamish, 2004; Lawrence and van Steenbergen, 2005). Water masters supervise flood water distribution, look after the maintenance of canals and dikes following heavy floods, by gathering and organizing farmers to build earthen dikes (*uqmas*). They do so by estimating the costs and charging each farmer proportionally to his irrigated area. Water Masters also resolve disputes according to established rules. Customary rules prohibit receiving flood water more than once in a 14 days period, expanding the command area of a given channel, digging new channels in order to irrigate reclaimed land or irrigating a neighbouring land which is not part of the command area. Despite of these well-established rules that regulate the access to land and water, conflicts occur frequently because of the scarcity of water (Bahamish, 2004).

Customary rules often embody equity considerations. In Yemen, until the 1950s Wadi Tuban and Wadi Zabid were considered as equitable system where rules and sanction were clearly established (Bahamish, 2004; Steenbergen et al., 2010). In Wadi Tuban command area, downstream farmers had the right to grow crops on the irrigated fields of their upstream neighbours. If crops were already cultivated, the yields had to be given to the immediate downstream farmers after the harvest (Steenbergen et al., 2010). The same intent to deal with disadvantaged downstream farmers was also found in the Wadi Laba irrigation system with a continuous search for a ‘fair’ water distribution (Mehari et al., 2005).

However, it is common that influential farmers try to break the inherited rules, which leads to conflicts. Indeed, there is great variation in farm area, resulting in repeated conflict between the users of spate water. *Sheiks* are highly respected and well remunerated for their work in managing spate systems, up to 5% of the farmer's crop (Bahamish, 2004). Nevertheless, *Sheiks* may act in an authoritarian way or fail to prevent such water conflicts. This does not favour the equitable management of spate systems, especially when communities and other institutions cannot challenge their ruling (Lawrence and van Steenbergen, 2005).

In central **Tunisia**, a strategy of household plots distribution has been adopted to cope with the upstream/downstream inequity. It consisted in the division of the command areas into three or four sections, with each landowner having a plot in each section. In this way, each household has access to spate water even if the limited flood does not reach all sections of the command area. However since the 1980s, because of land fragmentation (less than 0.1 ha), it was no longer possible to allocate a plot of land to each household in each section (Van Mazijk, 1988 cited by van Steenbergen et al., 2010).

In **Morocco**, village leaders (*Jemaâ*) along the *wadis*, have Friday meetings (after the Friday prayer) to manage irrigation water, resolve conflicts and take other decisions related to forests, grasslands, rural tracks, etc. (Keita, 2006). In the Aït Hakim and Aït Bouguemez valleys, sophisticated and flexible water sharing arrangements were formalized, with different upstream

and downstream irrigation rules, and also different village-level rules (Keita, 2006; Romagny and Riaux, 2007).

4.2.2 Springs/Oases

Oases are one of the first forms of community-managed irrigation systems in the region. In southern Tunisia, communities have been using ingenious management arrangements for centuries. These were developed in the thirteenth century not by the user community itself but by the scientist *Ibn Chabat (*1221-1285). He was a distinguished Tunisian historian, magistrate and engineer who developed an equitable system for water distribution in the Tozeur Great River. In the oases of southern Tunisia, groundwater was exploited by collecting the discharge of natural springs and water rights were defined in terms of units of time, as measured by a clepsydra (water clock). A water inspection agent had the duty to ensure that water rights were respected (Bédoucha, 1987). From the 1950s onwards, however, the flow from natural springs and artesian wells diminished as groundwater was overexploited, which led to agricultural decline and rural exodus.

Another form of cooperation between small farmers can be observed around the numerous springs over the whole region, notably in Morocco, Lebanon or Jordan. In Jordan communal forms of water management rely on time-based sharing of a water source, usually proportional to the size of irrigated area. Water rights have been determined by Islamic *sharea*, customary law, tribal values and the relationship between arable land and water rights (Salman et al., 2008). Violations of rules are usually minimal. When these violations occur they are mostly handled either by the farmers themselves or the head of the clans (Mazahreh et al., 2004; Salman et al., 2008). However recurring water shortages threaten the system and affects farmers' willingness to respect established rules.

4.2.3 Qanats

Qanats are underground drainage galleries stretching over several kilometres. These community-managed systems are known all over the Islamic world under different names (*Kettara* in Morocco, *Foggara* in Algeria, *Damous* in Tunisia, *qanats* in Iran, etc). The galleries appear on the surface as a chain of wells connecting with the manmade tunnel. The wells are used as entrance for maintenance and cleaning of galleries on a regular basis to prevent silting and collapsing. Since *Qanats* are the key to life in arid regions, many laws have been developed to govern their construction and use. Some of these laws regulate the distance between new *Qanat* tunnels and already existing tunnels. Other laws govern water distribution or responsibilities of the owners, notably regarding maintenance. The sustainablity of these systems varies a great deal. In Morocco, Jordan and Syria, Qanats have largely ceased to function, yet they have been preserved and revived in Oman (Lightfoot, 1996a) and some specific areas (Tafilalet in Morocco).

Qanats must be constantly repaired in order to maintain water flow, and this cost in a burden to the community. Land reforms and the introduction of well technology have, since the 1950s, radically changed water needs and perceptions regarding the utility of *Qanats*. *Qanats* are declining since they are not able to provide enough water for large-scale agriculture and therefore lost their importance for the youngest people, who opted to migrate or to shift to easier/cheaper water withdrawal techniques (Lightfoot, 1996b; Wessels and *Hoogeveen*, 2002). The spread of wells has resulted in a drop of aquifers, a decline/drying-up of qanats, the erosion of collective rules, and their physical degradation or destruction due to discontinued maintenance.

4.2.4 Collective wells

Sharing deep wells is a natural response to the high-cost of drilling such wells, and to the fact that the capacity generally exceeds the needs of one particular farmer. Such arrangements can typically be found in southern Algeria, Tunisia, or in the oases of Egypt. This is akin to what is referred to as 'water markets' in India or Pakistan, when the well owner sells his well water to neighbours. The well may belong to one person, or several individuals who have joined forces and budgets to drill it. Water allocation rules and whether/how they include financial arrangements will depend on each configuration.

In **Turkey**, community-management of irrigation systems, particularly for groundwater irrigation or pumping from natural watercourses, amounts to about one-quarter of the irrigated area (Svendsen and Nott, 2000). In such systems, the *muhtars* operate as the coordinators of operation and maintenance activities.

A different but related type of community-managed system emerges when a state, a donor or a development project intervenes in rain-fed, installs a tube-well with an irrigation network (or sometimes rehabilitates an earlier well) and then transfers this infrastructure to a newly established organization, for example a WUA. This type of systems can be found in the Maghreb (Faysse, 2011), Yemen, Sudan and other countries.

For example, in **Tunisia** small scale systems have been created around collective tube-wells in Central Tunisia (Sidi Bouzid, Kairouan, Gafa, Siliana, Zaghouan). Almost all of these types of 'Public Irrigation Schemes' (*Périmètres Public Irrigués*; PPI) are presently operated and managed by GDAs (Al Atiri, 2007). In the Sidi Bouzid governorate, GDAs were introduced in 1992 in small-scale systems (Ben Salem et al., 2007). Many IFAD projects in Tunisia addressed the creation and rehabilitation of such small scale systems served by collective wells, in addition to spate systems and small scale systems created around small dams.

In **Algeria**, collective pumping stations have been implemented since the 1940s in collective farms of the Mitidja valley located in the Central North (Potin, 2007). In Central Algeria, oases such as Ziban, El Oued Mzab, El Goléa flourished in the late 19th century thanks to collective deep artesian wells (Bouzaher, 1990). In the North East, for example the Ouargla oasis with over a million palm trees, shallow wells have been progressively replaced by more sophisticated deep tube-wells (Zella & Smadhi, 2007). Although the legal status of the management of these collective deep wells is not always clear from the literature, it is likely that communal management with strong public influences informally plays a major role.

In **Morocco**, the exploitation of groundwater is mainly the initiative of private farmers (Arrifi, 2012). However, collective deep-well projects have been constructed for small-scale irrigation systems. The policy that promoted WUAs or cooperative societies to take over these infrastructures is said to have failed, mainly because of the top-down implementation and insufficient financial support (Houdret, 2006).

4.2.5 Other forms of collective action

Many forms of community collective action become part of, or are subjected to government control, as part of the process of centralization of state power. This is an example where large irrigation systems come to overlap with community irrigation (see also §3.2 on Egypt). For centuries, inundation canals in Egypt diverted the Nile's annual floods onto farmers' lands via below-grade canals. From such canals, farmers have grouped themselves into informal groups for operating *Sakias,* water-wheels, to lift water into their fields. One type was driven by animals and another by the existing head-loss in the system. A well-documented example of farmer organization is the Fayoum gravity-based irrigation scheme, which lies in a natural depression of the Egyptian Western Desert with a total irrigated area of 145,000 ha. Farmers have a long

tradition of management in their own tertiary units, called *mesqas*, where water is distributed proportionally by rotational turns. Until recently, informal farmers' organizations were functioning in the Fayoum scheme (Mokhtar et al., 1996). A local chief oversaw that farmers respected the established schedule based on time shares. When farmers could not solve problems within their own mesqa*,* they approached one of the village leaders (Badawy, 2005). However, due to a reduction in supply, delayed maintenance, and other factors the system is facing equity, durability and environmental concerns. Since a number of years the state and the Dutch Cooperation have promoted WUA at the secondary and district levels (water boards), in an attempt to improve interfaces and coordination between the state and users (see section 5).

4.3 State interventions in community-managed systems

Until the 1970s, many farmer-managed irrigation systems were limited to subsistence agriculture and remained relatively autonomous from state intervention. National governments and International financial institutions focused their efforts on developing large and medium scale irrigation infrastructure. Since the 1970s, however, NEN countries started to develop modernization and rehabilitation programmes for these community managed systems. A large number of the IFAD projects reviewed fall within this category. From the 1980s onwards these programmes started to systematically include the formation of WUAs to administer the resources and infrastructure after the interventions. International donors and development organizations supported these programmes with loans and grants. Some of the main reasons behind such interventions were:

- to expand irrigated areas
- to make a better utilization of water and improve networks to achieve water savings, to compensate for resource decline
- to protect the land (from erosion and degradation) and infrastructure from destruction (lining of canals, river weirs, etc)
- to ensure better equity among farmers (Bahamish, 2004)
- to enhance water and soil productivity and farmers' incomes (Ghazouani et al., 2009)

These packages of technical interventions together with organizational efforts to formalize a WUA had various effects. In some case the effect was **disruptive** because the intervention weakened the customary system of rights and responsibilities, or the social capital of the community. Other cases, however, led to more **synergetic** relations between the communal organization and the WUA, because the community has been able to accommodate change for its own benefit. This section illustrates these different cases.

To prevent decline or to improve the potential of farmer-managed irrigation schemes (FMIS), state intervention was indispensable, it was often argued, but this had some unexpected consequences, as an example from **Tunisia** shows. Since the 1970s, the Southern water resources Plan (''Plan Directeur des Eaux du Sud'', PDES) developed the large-scale use of fossil groundwater resources from the Complex Terminal aquifer and the underlying Continental Intercalaire aquifer. The increasing availability of water resources helped prevent water shortages in oases, but also favoured the expansion of irrigated areas, which increased five-fold from 1963 to 2007. However, this expansion exceeded government plans because of the development of 'illegal deep wells belonging to private farmers and the continued planting of palm trees at the edge of existing oases. More recently, between 1997 and 2005, the APIOS project (*Amélioration des Périmètres Irrigués dans les Oasis du Sud*) aimed to enhance water productivity through water saving and improving irrigation and drainage networks in 88 oases.

These successive interventions have affected the customary arrangements of rules and rights that were previously well established. The rehabilitated irrigation networks and water-saving

devices required new collective rules and irrigation scheduling at the field level (Ghazouani et al., 2009). In the Fatnassa oasis, a local WUA was established as part of the government interventions and currently manages irrigation. However, the WUA was unable to enforce the collective rules for the distribution of water or prevent the irrigation of new plantations outside the former boundaries of the oasis. Only a few powerful farmers managed to expand their plantation through illegal wells (Ghazouani et al., 2012). In addition, the oases are currently facing overexploitation and degradation of groundwater resources and soil degradation due to waterlogging and salinization. The government interventions have thus unexpectedly generated equity, sustainability and environmental problems, by changing the rules and rights of the existing communal systems without being able to control deviant behaviours and enforce new rules.

In **Morocco** the impact of government interventions on equity in WUAs is a crucial issue. The government established a programme to modernize hydraulic networks in small and medium systems. In regions with hydraulic and social complexities (e.g. the Nfis, near Marrakech), farmers' commitment to participate in water management through WUAs was very weak. Farmers did not ask for the establishment of the associations, were not involved in their formation, and in the manner in which they were grouped under a particular WUA (Keita, 2006; Raki and Ruf, 2006; Valony, 2006). This situation jeopardizes the social organization of water management and intensifies inequity between farmers.

A classic example of the destruction of community-based management is the result of government decentralization in **Yemen** (Osmani, 2001). The government modernized and rehabilitated a large number of spate systems in the 1980s. As a result, the operation and maintenance of the spate irrigation systems was taken over by government employees and staff in the agricultural cooperatives (Lawrence and van Steenbergen, 2005). Modernized spate irrigation currently amounts to about 90,000 hectares, while traditional spate schemes only make up around 30,000 hectares (Kidane, 2009). The rehabilitation consisted of the construction of permanent diversion weirs, excavation and sometimes lining of canals, and land levelling. However, when the designs were not compatible with communal water rights, these interventions had a number of drawbacks. For example, the construction of permanent diversion structures at the head of the systems gave upstream farmers control over a large proportion of the available flows, to the detriment of downstream irrigators. Increased conflicts between upstream and downstream users occurred also related to the decline of traditional rules concerning the distribution of spate and base flows (Al-Eryani and Haddas, 1998 cited by Lawrence and van Steenbergen, 2005). In addition, some modernized spate systems suffered from sediment accumulation, which accelerated sedimentation of the command areas and flood channels (Lawrence and van Steenbergen, 2005).

In Wadi Zabid, the modernization of the irrigation system of intended to improve the living conditions of the downstream users and small farmers. The traditional systems of earthen weirs were replaced by permanent diversion structures and canal networks. The main consequence of this intervention was to weaken the Sheiks' authority in the maintenance of channels and in sanctioning farmers who violated customary rules. Another consequence was the shift to more water consumptive crops such as banana in upstream large fields belonging to entrepreneurs, undermining equity (Bahamish, 2004). They also undermined traditional community roles and authority in labour mobilization and the sanctioning of free riders.

State interventions and government policies also contributed indirectly to the decline of *Qanat* irrigation systems. *Qanat* networks have been undermined by new technologies, namely tube wells and modern dams, which altered the basin's natural water regime and changed not only the community, but also the environment on which it depends. For example in Morocco, tube wells subsidized by the government continue to displace the few remaining *Khettara* (qanats). Such a proliferation accentuated the drop of water table levels especially in South Tafilalt, where

even some deep wells are being abandoned, resulting in a loss of local control over water resources and rural migration (Lightfoot, 1996a).

However in some occasions, the modernization efforts and the introduction of WUAs by the state revitalized communal systems (See Box 4.1). The following example from Morocco shows this. In the Northern and Rif region of Morocco some small and medium-scale systems show that successful WUAs built their new formal organizations around existing informal ones and stakeholders sought to reposition themselves in terms of power and decision making (Romagny and Riaux, 2007). The coexistence between WUAs and the original communal organizations also occurred in the rural community of Ain Leuh, where water inspectors (amghar) were often chosen to be WUA presidents of the small irrigation systems that depend on water from the mountains (Kadiri et al., 2009a). This resolved the constraint of dysfunctional community-management, observed in other systems. The new WUAs have different roles as the simple task of managing irrigation turns and also serve as a legal protection for irrigators' rights (Bekkari et al., 2008). That formal associations revitalize the community-management is also noticed for the Moyen Sebou irrigation scheme of the Middle Atlas in Morocco. A group of young professionals put in place rigorous and straightforward procedures for water demands and irrigation scheduling to ascertain an equitable water share in a context of water scarcity (Bekkari and Yépez del Castillo, 2011). Similar projects in Jordan tried to build formal WUAs on traditional and informal cooperation structures (Salman et al., 2008). Coward (1976) already argued that "indigenous roles can be used for articulating bureaucracy and locality if accountability for job performance largely remains with the local water user groups". Hence, introduction of WUAs can revitalize communal systems, when communal actors are able to appropriate and trasnform this new organizational form to their needs and to fit local conditions (Kadiri et al., 2009).

Box 4.1: IFAD case study in Taourirt-Taforalt (Morocco): Appropriation of formal WUAs by community organizations

In community-managed irrigation systems, formal WUAs (AUEAs) have been shaped according to the ancestral rules defining water rights and distribution, e.g. in Farcia, Taghsrout, Irsane, Fath Al Kasmia, Aharrach.

Community-management of irrigation systems has always prevailed over formal management. Indeed, from the most successful WUA, in Farcia, to the less successful WUA, in Irsane, traditional water rights are the basis of formal organization. The case of Irsane showed that even though a formal WUA existed on paper, irrigation management was still done in the old way, i.e. following traditional irrigation turns. Every farmer in each village knows his water right and elder persons mediate conflicts. In addition, maintenance of main canals known as séguia and weirs are done in the traditional way: during the market day, a call is made to mobilize people for collective maintenance. Those who cannot take part in the works have to pay a worker to replace them. Nevertheless, the duration of irrigation interval decreased (e.g. in Aharrach a turn that used to irrigate 10 olive trees, now irrigate 30). Such change is related to the improvement of the irrigation infrastructure (lining of seguia).

The case of Taghsrout (50 ha) showed the revival of water rights and community management of irrigation after their disappearance. Indeed because of the depletion of the spring (as the only water resource), the irrigation system had been abandoned. In 1990 a well was dug, and later 1400 meters of canal were lined within the IFAD project. The well feeds two villages with many branches in each village. A conflict situation emerged when the two villages were merged in the project, as only one village had, in the past, right to the spring. After one year, the other village installed its own pump and deep well and formed a separate formal WUA.

Source: field visit to the PDA de Taourirt-Taforalt, Morocco (2012)

A critical feature of successful interventions in collective action is therefore to have farmers participate from the start. The case of Oued Zguifah in Tunesia (see Box 4.2) shows the failure of collective action in a spate irrigation system, especially because of a weak involvement of farmers in the implementation of the designed technical intervention. A similar case Taourit-Taforalt in Morocco shows the success of farmer participation in the conception and implementation of a planned technical intervention.

Box 4.2: IFAD case study in the PDAI of Siliana (Tunisia): Weakening of customary collective rules (GDA Oued Zguifah, 3 200 ha)

A users' association was created in 1912 during the French protectorate for the management of a river diversion scheme. Colons regularly employed workers to dredge the spring feeding the river. An upstream section of the river was also dredged to allow the re-direction of floods to the lands. After independence, a cooperative managed the irrigation system. The formal GDA was created in 2006.

The main technical interventions of IFAD in 2001 were the construction of a concrete weir and the creation of a distribution network to derive flood water to an additional area of 600 hectares.

At low floods, irrigation is managed according to a rotation, starting upstream and moving downstream. But when the flood is sufficiently high, all farmers can open their seguias (field channels) at the same time. Members have to pay fees in advance –before the flood season, but without any guarantee to receive water with the expected duration and also without a reimbursement guarantee. Before each flood season, the GDA hires a backhoe to dredge sediments accumulated at the level of the weir and also to clean up the seven valves located at the foot of the weir. However, the GDA was surprised by the speed of silting up. Consequently, today the seven valves are completely buried under sediment and the weir is out of use. According to the farmers and members of the GDA, two main reasons led to the ineffectiveness of the GDA:

First, farmers did not agree about the choice of the location of the actual weir. They argued that the location was chosen to serve the interest of powerful farmers located upstream. They believed that a location further down the river would decrease the speed of silting up. Second, farmers lost confidence in the GDA's capacity to provide the service they paid for, as they were not reimbursed when the GDA failed to operate the weir and distribute water as expected. Consequently, the number of members gradually decreased and so did the revenue. The GDA was not able to cover the dredging expenditures for more than 3 years.

The farmers protested about these two issues although they confirmed the positive impact of the technical intervention, especially in terms of decrease in labour.

Source: field visit to the PDARI of Siliana, Tunisia (2012)

4.4 Discussion and conclusions

Communities often have a great deal of capacity and experience in dealing with their local environment. They demonstrate a great ability to provide water equitably, especially when it becomes increasingly scarce. Farmer communities have been able to handle O&M successfully without a formal legal status. Factors that contributed to community resource management include:

- strong leadership

- the authority to resolve conflict

- rules for equitable water distribution

- customary rights systems to land and water

- collective maintenance (hydraulic property)

Several countries have modernized or rehabilitated community water systems through technical interventions such as the creation of deep wells, the rehabilitation of traditional spate irrigation systems or the construction of concrete diversion weirs. These engineering interventions were designed to improve water availability and were often accompanied by the formal establishment of WUAs to take charge of the new infrastructure after the project. While new diversion and water control structures may have succeeded in meeting 'some' technical objectives, successive external technical and organizational interventions have also weakened the 'social capital' of communities. Inappropriate infrastructural designs and the lack of participation of water users in the process had this effect. Further, local elite or power groups may manipulate external interventions such as the creation of a WUA to their initiative. This chapter discussed the following disruptive effects of state intervention on community water management: undermining of communal authority in conflict resolution, weakening of social organization, increasing upstream/downstream problems, engendering the violation of rules, and generating problems of equity, sustainability and environmental degradation.

Some of these interventions were based on a romanticized version of collective action in communities or water user groups. The crudest versions of these images consisted in harmonious and autonomous farming communities that sustainably manage their natural resources in a traditional (i.e. unchanging) and equitable way without facing any internal power differences, resource conflicts or the intervention of external sources of power, expertise and interest. Then decline sets in for diverse reasons (increase in scarcity, economic diversification, conjunctive water use,...) and threatens the benefits of collective action for future generations. This decline of traditional community systems thus underpinned many state and project interventions in this field (Mosse, 1999). The technical interventions were frequently accompanied by organizational interventions to create WUAs. In many rural areas this has produced an overlap, mix and coexistence of state and communal forms of organization with varying degrees of formality.

The threat to the social cohesion and capital of FMIS is thus also not simply external. In practice, many communal irrigation systems were never entirely autonomous, equal and stable in their structure, composition and boundaries. They encountered power differences, resource depletion and social conflicts. These may have led to inequity in water access, non-sustainable irrigation practices and overall underperformance of the system. For example, in this chapter we saw examples of the authoritarianism of leaders, their failure to prevent conflict, power, equity and environmental problems in collective action. The question is here whether community organizations have the capacity to cope with these negative internal or external trends.

In some cases farmers demonstrated resilience and succeeded to cope with state-created WUAs, by appropriating and adapting them to their local circumstance and needs. In such cases formal associations that were imposed by donors and authorities can be gradually adopted and transformed to local objectives and capacities. This can vitalize the way in which the communities develop capacities to manage water, collect fees and develop agriculture. The example in Morocco (Bekkari and Yépez del Castillo, 2011; Kadiri et al., 2009) can be an inspiration for such irrigation management, where opportunities were created and appropriated by new young and qualified leaders to emerge and deal with the challenges of scarcity and water management in a new and more equitable way.

5 WUAs in public irrigation schemes

In this section, following the three responsibility areas introduced in § 2.2, we first look broadly at where and how water management (arrangements, water savings, conflict resolution) has been changed by PIM/IMT policies, and then investigate issues of maintenance and financial management. Because of the sketchy nature of the evidence available, the examples given are mainly illustrative of the diversity of cases.

5.1 Water management

5.1.1 Water arrangements: adequacy and timeliness

The quality of water supply from the point of view of the users includes *adequacy* (accessing a quantity of water that is sufficient to meet one's needs) and *timeliness* (getting the amount of water at the right time). Adequate timing and/or predictability of water supply are crucial in irrigated agriculture, and often more important than adequacy itself. From a system or social point of view *equity* (no user gets an excess of water to the detriment of others), *water savings* (supply is adequate but not in excess of needs, and losses are limited), and *conflict resolution* are additional important objectives. Water adequacy alone is not enough to guarantee good water productivity.

These indicators are not unrelated. Schemes with sufficient and abundant water will more easily ensure adequacy and timeliness (irrespective of whether the WUAs are effective or not), often to the detriment of efficiency. In contrast water short schemes will not be able to ensure adequacy and coordination with users and enforcement of rotations and rules will be essential to ensuring a degree of equity and predictability. We will come back to this point in the following section. Head-end/tail-end inequity and more generally uncertainty in supply generates conflicts and also impacts efficiency: faced with uncertain supply farmers tend to over-irrigate their lands, for fear that water might not be forthcoming in the next irrigation rotation; a strategy, in effect, that aims at *storing* water in the soil profile, but which increases losses and may lead to environmental problems such as soil salinization or waterlogging. Evidence of improvement of water supply after PIM/IMT is quite patchy.

After transfer of water management responsibility to farmers' organizations, three WUAs in **Uzbekistan, Tajikistan and Kyrgyzstan** (Gunchinmaa and Yakubov, 2010) showed a low water delivery performance. But the Uzbek WUA was still performing better than the Kyrgyz and the Tajik WUAs, suggesting that self-governing organization is only partly a function of the institutional environment, and also influenced by the quality of maintenance of irrigation system, the size of the WUA, and other factors. The case of South Fergana canal in **Uzbekistan** (Abdullaev et al., 2009) some improvement occurred in terms of equity (tail-end farmers), transparency of water management, responsiveness of water managers to the water users complaints, and reduction of illegal water withdrawals.

In Abdel Hakam Pilot Project in the Gezira Irrigation Scheme (**Sudan**), the quality of supply was improved after transfer especially in termers of equity (tail-reach was improved). The improvement in the quality of water supply was mainly related to the improvement in the quality of maintenance of the irrigation network and, more importantly, in the participation of farmers (in kind and in labour) in works (Adam, 2003). Abdelhadi et al. (2004) reported similar results in the Gezira scheme where a block did not suffer any water shortages after farmers took over the O&M of their irrigation canals, but it is not clear how much of this is due to collective action.

In the Gediz River Basin in **Turkey** (Yercan, 2003), some positive effect was found after the turn-over, where the area irrigated moved from 80 to 83% and from 56 to 69% in Menemen and Saruhanlı irrigation schemes respectively. Another example in Turkey showed that 79% of the farmers were broadly satisfied with the performance of WUAs in terms of adequacy, fairness and timeliness in the Karacabey irrigation scheme (Kuşçu et al., 2008).

In **Egypt**, the improvement of the performance of the irrigation water system was expected to increase the efficiency of irrigated agriculture water use and services, and thus to have positive impacts on the quality of supply (water distribution, quantity, quality, equity and timeliness). In Bahr El-Nor branch canal area, where a BCWUA has been set up with the assistance of JICA, "surveys have shown that before the project 17% of the farmers had an adequate supply of water, 78% of the farmers claimed that the water was sometimes available, and 5% said it was not available. After the project, 97% of the farmers had availability of water during the scheduled period, whereas 3%indicated that water was only sometimes available" (Batt and Merkley, 2009). Such improvements are due to a better coordination between managers and BCWUAs but it is not clear however how long they endure after the project intervention ends.

5.1.2 Water saving

More efficient and user-controlled management brought about by PIM/IMT is also expected to lead to water savings. Here too, very few studies –if any– document changes in a convincing manner.

In **Turkey**, many WUAs were said to use excessive water in irrigation. Based on 1995-2002 data, Yildirim et al. (2007) showed that the area managed by the state had a higher relative water supply (3.33 to 3.49) compared with transferred areas (2.05 to 2.45). This 'inefficiency' of state-managed schemes was corroborated by Dadaser-Celik et al. (2008) who showed that a majority of farmers think that irrigation management is better in transferred than in DSI-managed schemes. According to Kuşçu et al. (2008), the relative water supply in the Bursa-Mustafakemalpaşa irrigation scheme, located in western Turkey, remained quite stable (from 1.5 to 1.6) between six years before and six years after the transfer (1992-2004). The main reason behind the lack of improvement in relative water supply can be related to the rejection of IMT by farmers. Uysal and Atışa, (2010) showed an improvement in relative water supply after transfer (from 1.2 for pre-IMT to 1.4 post-IMT) in the Kestel WUA (18,158 ha), not due to a change in overall water supply but rather to improved maintenance and repair, which reduced losses. In contrast Yavuz et al. (2006) showed that in the Lower Seyhan Basin the most important reasons for not achieving the objectives of IMT in terms of water savings and improvement of the performance of irrigation management were the neglect of the physical infrastructure, as well as social dimensions of irrigation management.

Another reason behind the excessive water use was uncertainty in irrigation scheduling (Easter and Liu, 2007). Many farmers indicated that they are aware of the problems created by excessive irrigation (waterlogging and unfair head-tail water distribution), but they also admitted that they intentionally irrigate more than necessary once water is available due to uncertainty on the next irrigation (Dadaser-Celik et al., 2008; an observation also made by Ghazouani et al., 2009, in **Tunisia**).

In **Egypt,** the central objective of the IIP and IIIMP projects were to reduce abstraction from canals and application at the field level. It was also expected that by applying continuous flow in secondary canals and making farmers would be encouraged to use water in 'a more rational way' (El-Kassar and El-Fotouh, 2008). WUAs would manage collective pumps according to needs and would therefore save water. In practice, it has been difficult to identify any change in water abstraction, partly because of the difficulty in establishing continuous flow in practice, (El-Kassar and El-Fotouh, 2008), and there are cases where the strategy might have even had the

opposite effect (Ezzat El-Agha, 2010). Like in many other places, water efficiency at both the plot and system level is heavily determined by the quality in supply ensured by scheme managers.

5.1.3 Conflict resolution

In large-scale irrigation schemes, conflicts may appear at all levels, between farmers of a same ditch or tertiary canal, between the WUAs of a same secondary canal, or between the secondary canals of a same main canal. Conflicts may also concern certain farmer groups and involve the agency itself.

In PIM policies, the WUAs at the tertiary and secondary levels are often precisely set up as a means of providing coordination arenas and improved information in order to reduce conflicts at a certain level. The analysis of two BCWUAs in **Egypt** by Batt and Merkley (2010) showed that while the district engineer formerly had to intervene in all disputes at the secondary (branch) canal level, only 16% of the problems were handled by him after BCWUAs were established, against 84% by the BCWUA leader. But the decrease in the number of farmer complaints recorded by an irrigation agency does not necessarily show the success of the transfer programs, like in **Turkey** (Svendsen and Nott, 2000) where complaints seemed to be shifted to the local level, where the frequency of water distribution conflicts was reported to have increased (Kuşçu et al., 2008).

But 'modernization projects' associating hardware and software components may also create conflicts for newly set up WUAs. In **Egypt** the mesqa level WUAs, especially when the capacity of the pump turns out to be a constraint with regard to meeting needs, may be the place of substantial conflicts that did not exist when farmers formerly used individual pumps. The collective action anticipated and desired by some projects does not often materialize as expected and is eventually strongly linked to the status of water supply locally, itself a reflection of the situation higher up in the system.

In **Azerbaijan** the conflicts were related to newly created WUAs which are still weak and the majority of farmers do not fully understand their tasks and responsibilities (Rzayev, 2007). WUAs are sometime not recognized by farmers as a means of resolving disputes. In **Kyrgyzstan** massive losses in the main system, associated water thefts, and the shift of monocropping collective farms to individual farming with diversified cropping patterns, many cases unresolved through informal negotiation, move along the administration hierarchies and eventually lead to top-down imposition of resolutions irrespective of WUAs (Ul Hassan et al., 2004).

In **Jordan**, the establishment of WUAs in the Jordan valley has taken 10 years of efforts to restore trust both between farmers of a same WUA, and between farmers and the JVA. As WUAs were empowered, one of the first benefits and actions that generated support from members was the removal of illegal connections. While it was believed that these had already been brought down to 5% of total supply, it was discovered that many farmers had made some private deals with some JVA staff and established illegal connections (Regner, 2012). By removing them the WUAs gained substantial credit with the farmers. Trust-building resulted in WUAs yielding several other benefits, including farmers abandoning the practice of over-irrigation, giving up destroying meters, better maintenance of the pump, more predictable supply and no further need for intermediate farm-pond storage (Salman et al., 2008). WUAs have shown that they were able to handle most of their internal conflicts.

5.2 Maintenance and physical sustainability

In most countries, ensuring the maintenance and the sustainability of hydraulic structures is one of the main responsibilities ascribed to WUAs (see introduction). Here again the situation is extremely varied, as illustrated by some examples from **Turkey:** in state managed irrigation scheme canal maintenance was better compared to WUAs managed schemes especially due to the availability of more funds, machinery and other equipment. In transferred irrigation systems, scheduling of maintenance activities became more dependent on fee collection rates. Indeed, water fees were generally said to be insufficient to cover operation and maintenance expenses at an adequate level. But an increase of water fees would be rejected by farmers (Dadaser-Celik et al., 2008).

Tekinel (2004) showed that the WUA in the Korkuteli irrigation system have generally demonstrated the ability to satisfactorily operate and maintain the transferred system at a cost generally less than that the earlier cost to the DSI.

More than 79% of farmers were satisfied about the quality of maintenance after transfer Bursa–Karacabey irrigation scheme (16 683 ha).

The transfer of Bursa-Mustafakemalpaşa irrigation scheme did not improve the quality of maintenance (Kuşçu et al., 2008).

In **Sudan**, Adam (2003) reported that the transfer of Abdel Hakam Pilot Project in the Gezira Irrigation Scheme improved the quality of maintenance. Farmers participated financially and, more important, physically (hours of labour), which globally reduced the cost of maintenance and improved the quality of supply.

In **Egypt,** the full responsibility O&M of the tertiary level after intervention of IIP and IIIMP ('improved mesqas') was handed over to farmers and their associations. Because of the dependence of farmers on the pumping station, maintenance/repairs have to be done. In some cases, when the pump has been stolen or has broken down and could not be replaced, farmers have switched back to individual pumping.

Maintenance is also an important objective of the programmes devoted to setting up Branch canal (secondary) WUAs. In the 4-year USAID-funded project on integrated water management districts (IWMD; see appendix on Egypt), BCWUAs were expected to participate in the planning and selection of maintenance and minor works, conduct one or more inspection of the branch canals and the drainage systems within the service area, with support from IWMD engineers and technicians; prepare a list of prioritized maintenance and minor works with support from IWMD engineers and technicians; and discuss the selection of maintenance and minor works with IWMD engineers and technicians (Barakat, 2009). Barakat (2009) reports that at the end of the project there was a strong cooperation between the IWMD and BCWUAs in all activities related to annual inspections, while maintenance and cleaning works had seen significant participation from BCWUAs in monitoring the cleaning process and participating in final inspection. BCWUAs rated the maintenance and cleaning works in their IWMDs as 70-100 percent successful.

In some countries farmers are used to contributing (in kind or in labour) to maintenance and repair works, like in central Asian countries (Gunchinmaa and Yakubov, 2010), or in the Gezira scheme (Adam, 2003; Abdelhadi et al., 2004, Garces-Restrepo et al., 2007). But more frequently large-scale schemes were maintained by public agencies and it is expectedly difficult to convince farmers that they suddenly have to handle part of the work (e.g. in Morocco), especially when the government retains ownership of physical facilities.

Some incentive needs to be found. Contributing to identification and prioritization of works (like Egypt's BCWUAs, see above) is helpful but might not be enough. IRG et al. (2001a) report that,

in Egypt, “all focus groups indicated 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. Focus group session results indicate that farmers strongly believe they can do many of the branch canal O&M operations at lower cost than the current system of contracting these operations out to private companies”. Subcontracting some of the minor tasks to farmers’ organizations (e.g. cutting grass) may be a source of income and build up a sense of ownership.

In the **Jordan** valley, subcontracting of O&M to the WUAs has been a cost-effective measure for the JVA and has at the same time empowered the associations. One could think of transferring heavy equipment (e.g. backhoe) to WUAs, but there is in general reluctance from agencies to relinquish capital-intensive activities. One also needs to have transparent and democratic WUAs to avoid this equipment to be used for the private use of influential members.

In practice, long-term maintenance (at the secondary level) is usually found to be beyond the financial and technical means of a WUA. This results in deferred maintenance. Unfortunately the same applies to the government, which finds itself facing the poorly anticipated but huge costs of maintaining large scale water infrastructures. In Azerbaijan, for example, hardly any maintenance was done during the 20 years after independence and even with the reform “It is still not clear to what extent the Government will adequately fund O&M at the main scheme level”, notably drainage. This is worrying when one considers the experience of the RCIDP project (Rehabilitation and Completion of Irrigation and Drainage Infrastructure Project) for which a survey by the IDA (which funded it) found “that around 80% of the infrastructure has been deteriorating in some form and needs urgent attention” (Appraisal Report of the NEDP, Azerbaijan, 2004).

These mixed observations dovetail with FAO’s synthesis study, stating that “the overall conclusion has to be that the willingness to undertake and to contribute to maintenance appears quite fragile in many schemes, possibly affecting the long-term sustainability of such schemes. The reasons for this appear to be reluctance, or inability, to make adequate cash payments to the WUA, possibly because the schemes are not producing sufficient returns, and the lack of acceptance of the responsibility for maintenance” (Garces-Restrepo et al., 2007).

5.3 Financial management

Financial management is a key issue of PIM/IMT, and this at two levels. First, the WUAs as associations need to be financially sustainable and to cover their running costs (these can vary substantially depending on whether, for example, the president and treasurers are paid by the association). Second they must also cover the expenditures related to their duties (e.g. O&M of tertiary level infrastructure).

The choice is between giving more to the WUAs (eg through state subsidies or authorization to generate additional income) so that they be able to achieve more (eg improving and expanding their maintenance works), and adopting measures to increase farmers’ direct contributions.

5.3.1 Reduction of governmental expenses

As mentioned earlier the most common reason behind IMT is the lack of public funds to cover O&M costs and the expectation that parts of these costs could/should be shifted onto farmers. The first objective for states is to reduce administrative costs, especially those related to staff salaries. In Turkey, for example, savings primarily came from reduced wage bill for system O&M personnel due to lower staffing intensity and operation expenses (Svendsen and Nott, 2000; Murray-Rust and Svendsen, 2001; Svendsen, 2001; Svendsen and Murray-Rust, 2001; Yercan

et al., 2004). Svendsen (2001) showed that O&M staff levels fell sharply, by 32% between 1993 and 1996, and then stabilized. However the actual staffing intensity (staff/1000 hectares) was shown to be 30% higher than it was in 1993 (Svendsen, 2001). The irrigation agency in Turkey (DSI) maintains overall O&M responsibilities, especially of dams and main supply and drainage channels, technical assistance to WUAs, and monitoring and recordkeeping, which may explain such high staffing intensity.

This decrease of state expenditures was paralleled with an increase in farmers' contributions (see Yazar, 2002; Garces-Restrepo et al., 2007), as observed also in Mexico. Policy documents acknowledge that this is bound to happen but generally add that these O&M costs are expected to decrease as farmers deal with them at a cost lower than the agency's. There is no way to really corroborate what could just be wishful thinking: when costs decreased it was often later found that maintenance had been deferred (Meinzen-Dick, 1997; Garces-Restrepo et al., 2007); and in all cases full maintenance costs are never known with accuracy (see above note on Morocco). More generally the overall economic performance of public and private irrigation management, the total costs of irrigation management to both the government and WUAs, as well as what PIM or IMT change, are hard to ascertain (Salas and Wilson, 2004).

5.3.2 Fee calculation and collection methods

Establishing the amount to be paid by farmers is a perilous task. Economic orthodoxy exhibits different techniques to come up with different types of costs (from current costs to "full" costs that include social and environmental externalities, and opportunity costs). This sophistication (especially because the full costs calculated are invariably non-commensurate with farmers' incomes and ability to pay), always gives way to more mundane political arbitrages whereby water prices are a compromise between actual O&M costs and what farmers accept to pay (gauged by the political risk associated with a particular price). This political risk varies with circumstances. In Jordan, water prices in the Valley have not been updated for some years and current social movements in the country rules out any change in that matter. In Morocco, the announcement of a rise in water fees in 2010 triggered angry protests in the Tadla scheme.

Some countries, like Turkey or Egypt, prefer to deliver bulk water at no cost to farmers, while expecting them to meet O&M costs, or part of it, in their own area.

In Azerbaijan, O&M fees collected by the WUAs established at the beginning of the 2000s were limited to 25% of the amount required to be paid to the State for ISF. This restriction starved the WUAs for O&M funds, undermined their capacity to face expenditures and achieve the maintenance works required, and they ended up being seen by farmers as merely organizations that distribute water and collect ISF for the State (van den Boom, 2007).

Water fees are calculated and recovered by WUAs in a variety of ways. The most common are area-based fees (Kazakhstan, Morocco, Egypt,..), sometimes with variations depending on the crop grown (eg Jordan Valley). Fees based on volumetric consumption (Turkey, Central Asian countries, many cases in Morocco and Tunisia, …) are more equitable but require adequate and expensive water measurement infrastructure and field data collection; they can also be based on duration (as a proxy for quantity) when there is no volumetric meter (Yemen, Jordan, spate systems and oasis in Tunisia).

In some cases, where it is difficult to mobilize cash from farmers, farmers are allowed to pay in kind, like in Kyrgyzstan for example (Ul Hassan et al., 2004). In the PIM pilot project in Sudan, farmers can pay either in cash or in equivalent bags of sorghum or groundnuts. The Irrigation Committee collected two bags of sorghum from each farmer, and the money received from the sale of these bags was used for summer maintenance and land preparation for the second season. The Revolving Fund itself was used to procure improved seeds and fertilizers (Adam,

2003). While such flexibility of payment improves the rate of fee collection, WUAs are left with the task (and risk) of marketing the produce collected.

Another issue with irrigation fee is the timing of money collection. Payments can be frequent, for example based on monthly or quarterly bills in the case of pumping schemes that require energy costs to be covered, or in bulk, either before (in Kazakhstan, Wegerich, 2008, or spate system in Tunisia (Siliana), or Yemen), or after the cropping season. Paying in advance has a number of advantages (farmers who don't pay can be excluded and therefore the incentive to pay is high; expenditures during the season can be covered, etc) but also drawbacks (if WUAs fail to provide the requested irrigation service, farmers cannot obtain any form of compensation nor get their money back (Merrey, 1996; Wegerich, 2008)). Payment of fees after the irrigation season, on the other hand, may leave WUAs short of funds, prevent necessary maintenance activities, and sometimes delay payment of salaries, as observed in some case in Turkey (see Dadaser-Celik et al., 2008).

5.3.3 Low recovery

Recovering costs in large scale irrigation schemes is an uphill battle. There is hardly any example of developing country where full cost-recovery is observed (for a global analysis see Cornish et al., 2004; and Molle and Berkoff, 2008). The three countries in the NEN region which did get some recognition for substantially raising irrigation fees, achieving high levels of recovery, and at times claiming to cover O&M costs were Morocco, Tunisia and Turkey. It later appeared, however, that Morocco had not fully computed the costs of maintenance of the main system, resulting in deferred maintenance and needs to later catch up with maintenance works.[6]

In practice, almost all the reviewed cases have faced financial shortfalls because a) the fees were set too low to cover actual costs, and b) the rate of recovery/payment was low. Reasons for suboptimal recovery include:

- lack of willingness/authority to set fees and to take appropriate collection measures (Tunisia);
- lack of will to apply sanctions, especially when powerful farmers are concerned, thus encouraging free-riding;
- not keeping promises on provision of subsidies by the state (Uzbekistan);
- farmers' low ability to pay (Central Asia), in particular in years of poor or unsold crops (Gunchinmaa and Yakubov, 2010);
- religious reluctance to pay for water, where water is considered a gift of God, as in Uzbekistan and Kyrgyzstan where fee collection remains a challenge for WUAs (Yakubov, 2011);
- a 'Soviet mentality', i.e. "the expectation that the state should put water at one's disposal for free" (Sehring, 2005), in some countries from the ex-Soviet Union like Kyrgyzstan, or Uzbekistan where, despite attempts to charge water since 2001, water is accounted for as a free resource (Gunchinmaa and Yakubov, 2010);
- poor irrigation service, and dysfunctional infrastructure, with farmers unwilling to pay for a service that is more of a constraint than an asset per se (Azerbaijan, non-rehabilitated).
- farmers, as result of poor and inadequate service, making investments in conjunctive use (typically wells), or reverting to rain-fed agriculture, thus losing interest in surface water (Tunisia);

[6] *A senior Moroccan water specialist, personal communication*

- degraded or non-functional metering devices where the state policy is to charge by volume (Uzbekistan, Kyrgyzstan, Tunisia);
- fees perceived as over-expensive and farmers dissatisfied with the charging system (Yercan, 2003; Kuşçu et al., 2009).
- farmers being forced to pay for state investments ('modernization', etc), against their will (Egypt, Morocco,…)
- the political risks associated with raising water fees (Jordan, Morocco)

In all the cases examined, the rate of ISF collection varied greatly, as for example in the case of **Kyrgyzstan** examined by Ul Hassan et al. (2004).

In 1993, **Turkey** accelerated the transfer of the management of 87% of its 1.9 million ha of large-scale irrigation to Irrigation districts (IDs) (generally corresponding to a secondary canal). The program was successful in transferring costs to farmers (Yercan, 2003; Yercan et al., 2004). Recovery was around 95% in 2003, against 32-50% in agency-managed schemes (Çakmak et al., 2004). This result was partly due to a policy of sanctions, which applied high interest rates for unpaid fees (Yercan et al., 2008).

High collection fees are often achieved in the framework of aid/development projects, where injection of cash and palpable benefits in a controlled environment result in higher farmers' payments: in **Sudan** within the pilot IMT in the Gezira scheme fee collection rate reached 87% (Adam, 2003). In **Yemen**, of the total of 23 million YR of O&M costs during the IIP project, the WUAs in Wadi Tuban and Wadi Zabid have contributed about 19 million YR. Farmers committed to making regular contributions towards routine O&M works and were able to effectively maintain irrigation infrastructures during the five years of the project (World Bank, 2009).

In **Azerbaijan**, the IFAD project with 6 WUAs also achieved good results (see Box 5.1). In other WUAs developed under World Bank projects, charges vary between 5 AZN/ha (in low value agricultural areas, especially in the south) and 50 AZN/ha, with the higher WUA ISF occurring in areas with high value orchards and vegetables in the north. These WUAs increased their Irrigation Service Fees (ISF) by 3 to 5 times, with a collection rate of around 80%, thus enabling them to conduct most of the planned O&M of rehabilitated systems. The amount collected ranges from about 25% of actual needs for O&M to nearly 100% of requirement. It has been estimated that the average level needed for the WUA ISF to cover all O&M, fixed costs and a repayment rate for rehabilitation of 10% would be approximately $46 per ha. This would constitute only 3% of the net margin per ha in the Northern and Nakchivan regions and 4% in the Central Region (World Bank, 2011a, 2011b).

Cases where WUAs are financially autonomous are generally found in small-scale schemes and are rare in public schemes. Irrigation systems based on pumps tend to have better cost-recovery mechanisms because of the necessity to cover energy costs in order to access water (e.g. New lands and IIP areas in the Nile delta, in Egypt), but this does not necessarily extend to maintenance requirements.

Box 5.1: Cost recovery for WUAs created within the Farm Privatization Project funded by IFAD in Azerbaijan

Six WUAs have been established and are distributing water, managing water infrastructure, collecting water charges and enhancing cooperation on water issues among their members. WUAs have been able to levy and collect water charges at levels sufficient to cover the cost of water from SAIC (the state agency), as well as the on-farm irrigation and drainage system O&M needs of the WUA. The water charges collected covered 100% of the cost of WUA operations (though the price of water made available by the SAIC may be subsidized, and charges do not cover the full cost of water provision). However, when the government capped the fees that

WUAs can levy on their members, their ability to adequately discharge their responsibility for system O&M was significantly undermined.

"The majority of the six WUAs achieved good repayment rates of water charges, but the current levels of irrigation fees paid by members while sufficient to cover immediate O&M costs, do not provide for the replacement costs of O&M capital equipment. While the legal framework for effective WUAs exists, its implementation is still incomplete and the WUAs current water price policy must evolve overtime, with support from SAIC, to allow for appropriate increases in water charges that would result into fully financially viable WUAs".

Farmers may refuse to pay increased water charges to the WUA, thereby undermining the financial viability of WUAs. Financial analyses of farm models clearly indicated that farmers can afford water charges that will enable WUAs to be financially sustainable. Furthermore, experience indicates that if WUA deliver water adequately farmers will normally pay. There is a risk, given the legacy of the command economy, that the WUAs will not operate as transparent entities and that farmers will not receive the required amount of water. To counter this risk the project financed a large amount of awareness building and undertook intensive public relations campaigns to convince farmers of the imperative of paying their water fees, as well as training and related activities both for the WUA membership, managers, staff and governing board.

Source: Appraisal Report of the NEDP (2004) and Supervision Mission of the NEDP, Azerbaijan (2010)

Box 5.2: Low cost recovery for WUAs created within the Farm Privatization Project funded by IFAD in South Tunisia

The durability of infrastructure is threatened by the insufficient financial resources of GDAs and the limited outlays provided by the administration. GDA rely on subsidies to ensure maintenance tasks and these are insufficient. Revenue from water fees only covers energy costs. It is apparent that a long-term strategy ensuring the sustainability of the investment made requires a higher mobilization of funds, that neither side seems to be able to ensure at the moment.

Source : Rapport d'achevement of the PRODESUD, Tunisia (2010)

In contrast, in **Tunisia**, but this covers both farmer and state-managed systems, only 27% of WUAs succeeded in covering their entire O&M costs, while 28% of them covered even less than 50% of those costs and were still subsidized by the government during 2003 (Frija, 2009). In **Azerbaijan**, as a whole, only 12% of irrigation water fees were collected (Rzayev, 2007).

Water fees are sometime imposed by projects. In El-Ibrahimia branch canal area, **Egypt**, where IIP collective pumps have been installed, a survey showed that almost 100% of the farmers in the survey were not asked about whether they wanted a project in their area or not, and that it was all done exclusively by government decision (Batt and Merkley, 2009). Likewise, Bergh (2007) analyses a project in Southern **Morocco** "*where the state contributed 60 percent of total costs, and the farmers the remaining 40 percent in the form of 'direct (financial) participation' to be paid over 20 years, with an open-ended fee for irrigation water to cover the investment and operating costs of the irrigation networks. Hence this contractual partnership was not entered into by the partners' free consent, but was decreed by law based on national interests*".

Insufficient supply and/or high fees may push farmers to revert to rain-fed irrigation or invest in private pumps and use groundwater, as observed in Tunisia and in the sprinkler section of the Gharb scheme, Morocco, where the tariffs was €0.03/m³, twice the tariff in the surface irrigation sector (Doukkali, 2005).

5.3.4 Managing accounts

What is the performance of WUAs regarding accounting and financial management? Oddly enough, while it is emphasized that this function is the one that most requires capacity-building, hardly any report/article dwells on how WUAs effectively manage their finance. We also know little about the transparency of management and whether wrongdoing is frequent or not.

5.4 Conclusion

This review of the performance of WUAs is disappointing. One of the reasons is the high diversity of situations and reporting. There is a mixture of data that relates to ongoing projects, projects that have just been completed, as well as more general country level analyses. As indicated in the introduction of this section, most of the literature available is very sketchy in its description of how operation and maintenance are conducted in practice.

What transpires from the preceding three sections, even taking into account the lack of in-depth studies, is not altogether very engaging. Merely improving coordination and management by users at the tertiary level, where they were in general already active, does not radically improve the efficiency and the equity of water distribution. Where collective action has not occurred before it is very rare that institutional building by a given project is able to come up with an efficient organization. In the absence of an improvement in the manner water is distributed to the different user groups, which refers to management by the *agency* and not by the farmers themselves, it is very hard to improve local water management. Instances where management transfers have resulted in commitments from the agency, and therefore in creating a degree of accountability, are very rare in the region. Even transfer agreements in Turkey do not mention the bulk amount of water that a given WUA is supposed to receive. Likewise, the local maintenance that can be done through farmers' collective action (typically cutting grass and cleaning small canals) is hard to elicit through an external intervention if farmers have not been able to organize in the past.

A key element of physical sustainability, improved management, but also accountability mechanisms is the structure of financial flows (this point will be examined in more detail in §8.3), often limited to payment directed to the state, with very little left to support WUAs activities. Consequently, and also expectedly, cost recovery has been improved only in the situations where a project as bringing substantial benefits, or when the state had the means to impose high rates of cost recovery. Most of the policies deployed in the region chiefly attempt to raise the financial contribution of farmers.

As there are very few, if any, both performing and enduring WUAs in large-scale public irrigation schemes, it is virtually impossible to identify conditions or contexts, conducing to successful comanagement. In the next section, however, we review a number of internal and external factors that are typically correlated with the performance of associations.

6 Internal factors

Just like farm performance depends on the quality of the individual farmer, WUAs' fate depends on a number of internal characteristics (as well as external factors, reviewed in the following section). The literature on IMT has long identified a number of key (sometime interrelated) factors including:

- the size of the association
- social cohesion and social capital
- the existence of leadership
- the administrative and technical capacity of staff (more generally the level of education)
- the importance of farming in local livelihoods (economic diversification leads to differential interests in maintaining the systems and weakening of individual commitments)
- the necessity of collective action for ensuring supply (typically pumping schemes do require permanent mobilization of funds to pay for energy and repairs)
- the production of high-value cash-crop dependant on water supply

Some of these factors, and how they played out in the NEN region, are illustrated in this section.

6.1 Elections, board nomination and political interference

A democratic process for the selection of user representatives and a directive board seems to be a desirable feature of legal WUA frameworks. These almost invariably have provisions for the election of user representatives as General Assembly members and for board positions (president, secretary, and treasurer). Democratic procedures for choosing and removing leaders and staff members are important in creating healthy relations between farmers and formal organizations, and increase the legitimacy of the latter (Rzayev, 2007; Bruns and Taher, 2009).

Yet, in many irrigation systems in **Tunisia** (Canessa, 2010; field visit to IFAD projects in Siliana and Zaghouan; see Box 6.1), Kazakhstan (Wegerich, 2008) and Morocco (Bergh, 2007), heads and staff members of WUAs are in fact appointed by the higher administration (e.g. local representative of the Ministry of Interior) or the cells of the ex-ruling party (in Tunisia). Elections are held but candidates often have to be anointed by the state. In **Morocco**, control over WUAs is also exerted through the obligatory nomination of a 7th board member (dubbed '*the seventh man*') by the Administration, as a representative of the Ministry of Agriculture according to the Article 12 of the Law no 02-84. In addition, Article 15 stipulates that other representatives of the government can have advisory roles if they wish so. The official reason for this dispositive is to facilitate communication with the government, whereby WUAs can raise questions, make inquiries, and ask for advice from technical staff. But in practice it was used as a means of imposing governmental decisions, and often as a means of serving the private interests of those at higher levels instead of the farmers' needs and interests. In **Kazakhstan** and **Kyrgyzstan**, WUAs' decision-making is also somewhat dominated by local government structures (Kangur, 2008).

As could be expected, WUAs dominated by local or higher political power tend to lack internal legitimacy and be ineffective. Hellegers et al. (2007) observed, in the Tadla irrigation scheme, Morocco, a complete absence of communication between members and their representatives, and no visible difference in irrigation management between a sector managed by a WUA and a sector without a WUA. In the same scheme van Vuren et al. (2004) "observed that strong local leaders serve their own personal interests in disfavour of the "common" farmers".

The election of WUA boards is therefore not unproblematic. The democratic nature of elections is affected by the high rate of illiteracy of farmers. More than 70 % are illiterate in the Tadla case, **Morocco** (van Vuren et al., 2004). In some cases WUA board members used their new position and power as springboards to political positions. In addition, interference from powerful people may jeopardize the performance of WUAs, which become 'puppet organizations' (Bruns and Taher, 2009) serving the interests of the elite. In such organizations, elections may take place only to conform to the requested formal procedure. They are perhaps often a necessary step, but clearly not sufficient to ensure proper management of the WUAs and their representativeness.

Box 6.1: IFAD case study in Siliana and Zaghouan (Tunisia): Political aspect of water management and its effect on the performance of WUAs

The performance of GDAs (WUAs) in Tunisia is influenced by political interference. At the local level, *El-Omda*, who is a representative of the government, is the main link between the government and the farmers. He is involved in the management of natural resources and also in the political, social and economic life of the community.

Before the revolution of 14 January 2011, local representatives of the ruling RCD party (Rassemblement Constitutionnel Démocratique) had a determinant role in the decision-making and management of any activity related to the functioning of GDAs. They were also taking advantage of their administrative and political position to influence the decisions of the local representative of the Ministry of Agriculture (CRDA). The GDA's budget was also under the control of the RCD delegate, who would sometimes use its funds for some unrelated activity. This represented a significant drain on resources for WUAs, which already had financial difficulties. Many farmers attested that the main source of financial difficulties of the WUAs was related to corruption and abuse of power from the directors and managerial board, who served the interests of those at higher levels and their own interests, instead of representing the farmers' needs and interests.

The RCD delegate and *el Omda* played also a role in appointing the heads and administrative committees of WUAs, proposing candidates which would support the interests and the orientations of the party, irrespective of their management capacity. They also interfered in the choice of potential beneficiaries of credit and financial subsidies. The GDA's board was rarely renewed. Consequently, the RCD delegate and *el Omda* ensured a control over the irrigation sector by exerting various pressures and intervening in the electoral process and the day-to-day management of the WUAs. After the revolution, farmers dismissed the GDAs in four of the projects visited.

Source: field visits to PDARI of Siliana and Zaghouan, Tunisia (2012)

6.2 Social homogeneity and 'social capital'

Social capital and cohesion is found to be essential in the management of water resources from small to large irrigation systems. Some WUAs took root in a special environment characterized by a great tradition of social cohesion and mutual trust, e.g. the GDA of Jradou in Zaghouan (Tunisia). Although this reading may actually obscure the fact that cohesion was also related to the political control of the party in power, as identified in the last box (see Box 6.1).

As evidenced also in chapter 4 about community systems, there is more diversity between farmers than often expected. Water users within a command area are usually considered as a homogenous group of people with similar interests and stakes in the system. This is not true given for example the very different stakes that the head-reach and the tail-end farmers have

and hence the difficulty in engineering successful farmer management in public irrigation systems (Facon, 2010). In Turkey, even though the heads and members are elected, big farmers close to political power are favoured by WUA management (Kadirbeyoğlu and Özertan, 2011), which may not benefit social capital. The absence of 'social capital' and the relatively new social fabric of settlements developed in new large-scale irrigated systems as in Egypt (West Nubaria) or in Jordan (Jordan valley) are a crucial obstacle to the establishment and durability of WUAs.

Another well documented collective action problem is the impact of economic diversification on the individual incentives to contribute to collective action. It is difficult, for example, to obtain contributions in kind, like labour for cleaning grass and dredging small canal, from water users who are 'Sunday farmers' and have another major economic activity. They will often pay money to the WUA instead of participating physically. The trend, anyway, is that most works are more easily done by machinery and this contributes to generalizing cash contributions instead of in-kind ones.

But absentee or disinterested farmers also impact water management because they are not always present to manage water when it is available. They may care less about the impact on yields because farming is simply not so important to them. Farmers in the Jordan Valley, for example, are quite heterogeneous, ranging from subsistence farmers to high-tech investors growing crops for exports, throughout to urban owners (Sunday farmers) who adopt extensive and labour-minimizing crops (e.g. citrus), and care more about the small house and swimming pool they have built in the middle of the grove for their week-end.

Another factor that contributes to undermine social cohesiveness is the conjunctive use of water. Faced with insufficient and uncertain supply, farmers look for other water sources from which they can pump such as waterways, wetlands, and groundwater. Most large-scale schemes are now peppered with wells and individual pumps that provides farmers with a means to obviate the need for collective action. Often farmers who can dig deep wells or can pump directly from a drain, tend to detach themselves from the group and seek their autonomy. This is also very clear in Egypt, where groundwater use is quite frequent in the upstream part of the delta and where the use of drainage water increases as one moves downstream. In Morocco irrigation schemes accommodate thousands of tube wells and differential access to alternative sources translates in differential motivation to contribute to collective action.

Another issue that pertains to social differentiation is how land owners and land users are considered in the official statuses of the WUAs. If only land owners are considered eligible as members then all tenants are excluded from the group, and this may undermine its functioning. If all cultivators are able to be member, irrespective of whether they own the land (e.g. Morocco), then difficulties often arise with regard to paying the membership or water fees, when it is not clear to whom and what these payments correspond. In case of short-term contracts too, it is difficult to have tenants adhere or contribute to collective action.

6.3 Leadership

In communal irrigation systems the quality of management is often closely dependent on the personality and level of initiative of leaders. The success and sustainability of WUAs were found to depend largely on the "right kind of multiple local leadership" (Pant, 2008). According to Pant (2008), leaders are "such rural elites who had local influence, high socio-economic status but who had a propensity to come forward to work for a common good where they could derive advantage for themselves also in some common good".

In Sudan, the presence of a strong local branch of the farmers' union and supportive political leadership were factors of success of farmers-managed systems (Samad, 1996). For

Kazakhstan also the strong leadership in some WUAs in Osh Province contributed to their relatively better performance (Kazbekov et al., 2009). In the Nubaria project, Egypt, three of the five WUAs considered as successful (see Box 6.2) displayed very strong leadership. Likewise, the three WUAs (out of 11) of the Tadla scheme, Morocco, found by Freitas (1996) to show some activity and to be promising were all characterized by a strong leadership.

In contrast, poor leadership may jeopardize WUAs' performance when direct farmer participation in WUAs' governance is weak and when political appointees are elected as "leaders".

Box 6.2: IFAD case study in the in West-Nubaria (Egypt): Strong leadership

The key to the success of this WUU was building on an irrigation organization that was functioning before the IFAD intervention. Central was that the head of the WUU played a central role in the organization of irrigation rotations and the control over the pump station keys. To participate in the irrigation schedule, each farmer had to ask for the key from the head and give it back to him once finishing the allocated time. The authority for this position was legitimate, because the farmers recognized the importance of this agreed role to sustain the rules of water distribution. Because of the strong leadership and in spite of repetitive power cuts and water leakages from the lined but broken mesqa canals, water conflicts between farmers were very scarce. Before the establishment of the WUU and the decision to give this role to the leader, frequent verbal conflicts and heavy physical confrontations between farmers were reported.

Source: field visits to WNRDP, Egypt (2012)

What is important is that the authority to exercise strong leadership is derived from the community or the constituency of water users. When building on existing irrigation organizations, the source of authority that legitimates (strong) leadership ideally remains internal. However, in practice this kind of leadership is often dependent also on external actors such as the state, donors, projects or particular political and economic elites. Since the examples of strong leadership sometimes come from countries with an authoritarian political regime, it is possible that what some may see as strong leadership would, for others, qualify as authoritarian leadership. How to distinguish these depends on the source of authority but is also a matter of interpretation and depends on the observer. Of course, this will also influence the assessment of its beneficial role for improving the performance of a WUA or vice versa.

6.4 WUA's capacity and commitment

The quality of WUA management is linked to the capacity and professionalism of the staff and the degree of commitment of the WUA's members to their organization. It is crucial for a management board to have management skills, know how to solve disputes, a technical staff that can deal with technical problems and an administrative staff that is responsible for fee collection. Hence, it is important to create new competencies among managers, technicians and administrators and capacity building and training therefore seems crucial (see also section 7.3). However, a main difficulty is to get qualified and committed personnel for leading positions, when they are paid little or nothing for the job (Sehring, 2005). In the case of technical staff this can be resolved more easily when their salaries are derived from the irrigation fees paid by members. These technicians have to work extremely hard to meet members' expectations. "Farmers want to see those whom they trust and hire for day-to-day management of their irrigation systems as somebody who can make their life easier" (Yakubov, 2011).

The case of Tadla scheme in Morocco shows that WUAs which were inactive for years, became more active again when a younger and more informed generation became involved in irrigation

management (Faysse et al., 2010). Kadiri et al. (2009a) showed also that the competitive recruitment of young graduates had played an important role in the improvement of management in the Moyen Sebou irrigation scheme in Morocco. They simplified administrative procedures whilst maintaining a sufficient degree of freedom to adapt the rules in place when needed. Newly hired young technicians improved day-to-day management and learned to deal with routine management practices, but also reacted more quickly to emergencies (breakdowns of canals, pumps).

However, the capacity and level of commitment of WUAs is also the result of the centralization of water management that undermined the role of local organizations in water management. In cases with a strong presence of central governments and their local representatives, farmers may have very little confidence in their own ability to perform the necessary tasks. For example in Egypt, water users strongly believe that the government is the most capable to perform O&M and does it more cheaply and do not want to be responsible for it (Moustafa, 2004). This form of dependence is clearly a product of state intervention and centralization in water management, because farmers were capable of local irrigation management before, but were increasingly made dependent on external sources of expertise, technology and authority. A lack of confidence is also noticed in Kyrgyzstan where farmers were uncertain about how to form and operate a sustainable WUA, because of the lack of experience with independent farmer organizations in the Soviet era (Johnson III et al., 2002).

Box 6.3: IFAD project in Azerbaijan: Fee collection for the government?

Are WUAs created for water users or for the government? In the North-East Development Project (NEDP) of Azerbaijan, the general level of knowledge of the members about WUAs is limited. Even though WUAs have already shown to be quite effective in collecting water fees, they have been less effective in informing members about the purpose or use of the fees. This will become increasingly important as fees are increased over time. As a consequence, the WUA is mainly seen as an organization to distribute water and collect the water fees for the State Amelioration and Irrigation Committee (SAIC), rather than a genuine farmer-led organization with the mandate of managing irrigation and drainage infrastructure. In this case the need for a WUA is thus more externally driven than internally.

Source: Appraisal Report of the NEDP, Azerbaijan (2004)

Instead of becoming strong autonomous organizations, many WUAs remain dependent on external sources of finance, expertise and authority. They continue **to depend on project activities and financial resources** particularly subsidies for capital investment costs of building and improving major infrastructure. Many experiences showed that WUAs that were created with donor support became inactive or disappeared a few years after the end of the project. In such cases, organizations exist only on paper with little or no commitment and support from members.

In many cases that we have reviewed, the formal creation of WUAs is just as instrumental to external interests as reflecting an internal urge for collective action. In several cases WUAs helped the achievement of projects' objectives. Bruns and Taher (2009) reported that in surface and groundwater irrigation projects in Yemen "*WUOs have initiated requests, mobilized resources, and taken part in planning and implementing projects for rural water supply and for surface irrigation. For groundwater irrigation, WUOs have facilitated provision of pipes and other subsidized irrigation equipment intended to reduce water consumption, and helped improve awareness that groundwater resources are limited and being depleted*". In the case of Gezira project in Sudan, the farmer's unions supported the project and provided effective support to the farmers' training. Successive participatory approaches are believed to have built farmers'

confidence and proved that they can successfully handle the O&M provided that they received adequate training (Abdelhadi et al., 2004).

In such cases it is hard to judge the actual level of activity of WUAs. The frequency of formal meetings (most of formal farmers unions have to organize an annual general assembly, elect WUA office holders, approve budget and work plan) does not reflect actual collective action. In the PDARI of Siliana and Zaghouan, Tunisia, informal interactions were shown to be very important (see Box 6.4).

Box 6.4: IFAD case study in Siliana and Zaghouan (Tunisia): Formal and informal meetings

What does the number of formal meetings really reflect? GDAs (WUAs) in Tunisia have to hold at least an annual meeting to establish their budget and plan their main O&M activities. The regularity of formal routine meetings varies widely within the different GDAs from monthly, to quarterly, or half yearly or yearly, and may depend on the willingness to follow the Ministry of Agriculture's rules. Formal meetings are also called and aimed by the RCD party representative and *el Omda* for the approval of the budget, and especially for decisions in political matters. There are also meetings called by the Ministry for the training of board members, or sensitizing farmers to the importance of issues such as paying water fees to allow the WUAs to pay invoices of the company of electricity (STEG). Generally it is the president, the treasurer and few other members who regularly attend the formal meetings.

The decision to call for a formal meeting is also triggered by problems such as conflicts between farmers, requests for the extension of the irrigated area, repair of big breaks on the pumps or in the irrigation network, etc. and these matter more to farmers in general. But such indicator can be misleading, and informal meetings at cafés and other places, or even phone calls, be more important than the formal gatherings. In the seventeen GDAs visited, the number of informal meetings was found to be much higher than formal ones.

After the revolution in 23% of visited GDAs farmers have broken with board members due to the declared corruption and abuse of power.

Source: field visits to the PDARI of Zaghouan and Siliana, Tunisia (2012)

6.5 The origin of the WUA

A history of 'informal' farmer-managed irrigation has a strong impact on a WUA and its performance. Formal WUAs often build on the basis of customary organizations, in which rules for equitable water distribution often existed. These are more likely to be more effective than those built during and after soviet times in Central Asia, without any direct local experience in water management and replacing centralist structures of water management. For example, in the Province of Khorezm in Uzbekistan, associations were not participatory, with neither collective decision-making on water allocation nor equal water distribution. As a consequence, the WUAs tended to keep relying on the old structure of the collective farm which was still powerful (Wegerich, 2002). Another example comes from Azerbaijan (see Box 6.5). In contrast, Vidal et al. (2006) indicate that the management of modernized lined mesqa (tertiary canals) in Beni Ibeid command area situated in middle Egypt has been successful, mainly because farmers were informally organized before the modernization.

Box 6.5: IFAD project in Azerbaijan: Influence of history and context on the WUA's performance

The organization of farmers in the six pilot areas into WUAs was successfully achieved and the WUA model was replicated outside the pilot areas. Nevertheless, the adoption of WUAs is not without problem. One issue is the capacity of ex-farm workers turned farm owners to take

appropriate farm management decisions. Another issue is the impact of the power structure and operating procedures of the former authoritarian farm management on the WUAs. The people in positions of power have become important interest groups that continue to play a role. Nevertheless a sense of ownership of land and irrigation facilities is developing among members of WUAs.

Source: Country strategic opportunities Programme (COSOP), Azerbaijan (2003)

6.6 Accountability and transparency

Successful and sustainable WUAs need to keep transparent and accountable records of irrigation service fees. This is crucial for the legitimacy of the WUA and to ensure farmers' willingness to pay for services. In some cases in Kazakhstan farmers complained that the fee system was not transparent and that irrigation tariffs may vary from turn to turn or from farmer to farmer.

In Tunisia, the actual institutional framework makes the control of WUAs' revenues and expenditures a difficult task, allowing for financial irregularities and the forging of bills (Field visit to IFAD projects). Transparency also involves a 'right to know' about the relevant details of organizational action, which requires record keeping especially regarding the flow and distribution of water, services and money (Ul Hassan et al., 2004).

Box 6.6: Lack of accountability of the WUA's Executive Committee in Gash, Sudan

The Executive Committee (EC) of the WUA of Tendelai is reported not to be accountable to its constituency and to mismanage the WUA's land. This occurs in the context of a project to improve spate systems around the Gash river. The EC was accused of alienating land from their members. It allocated 570 feddan covered with mesquite (an invasive shrub) for the Association members, but reserved and captured 685 feddan of good land for themselves (season 2007/2008). This problem of power abuse was discovered during the harvest season and the case is now in court.

Source: Mid Term Review Report of the GSLRP, Sudan (2008)

6.7 Diversification of activities and horizontal integration

WUAs can improve their financially viability by diversifying their activities and integrating horizontally in a wider market. The extension of services by WUAs beyond irrigation can include other services such as input supply, credit, storage and marketing to generate extra revenues. This is widely believed to strengthen the WUAs through the provision of additional incentives to their members (Meinzen-Dick, 1997). A WUA with strong leadership and social cohesion can be able to innovate and diversify its activities (case of Jradou in Tunisia, see Box 6.7).

Most of the WUAs in the NEN region are still single-purpose organizations. Nevertheless, there are several examples of WUAs taking up other commercial activities to diversify their sources of income and meet the needs of members for other services. For example in Morocco, some WUAs started to supply water to farmers located outside the official irrigation system, while charging them higher fees, although this practice remained informal and even illegal (Errahj et al., 2009). Another example in Tunisia, in the IFAD project of Zaghouan, showed the importance of additional revenues for full cost recovery and also in getting lower cost services, like inputs and seed provision closer to the farmers (see Box 6.7). The staff of this WUA as well as the Ministry of Agriculture underlined the importance of such commercial activities in the financial

viability of the WUA, since it is the only organization which has been able to accumulate reserve funds to solve future needs for major repairs and renewal.

International organizations also promote successful examples of horizontal integration. The Gezira scheme is an interesting case where the FAO deposited seed money for a revolving fund used to buy various inputs. The willingness to pay back, to keep the revolving fund alive for the next season, was estimated to be 80%. The high recovery rate was achieved thanks to measures like grants for farmers with satisfactory field performance, and the financial committee had the right to recover the money from the payment for cotton production directly from the Gezira scheme administration office (Abdelhadi et al., 2004). From a donor perspective, the emphasis on WUAs and their economic diversification is to improve their sustainability after a project. To survive under post-project conditions, the development of a different mix of commercial activities can be considered as a means of getting farmers and their organizations more independent from project activities and resources.

One of the reasons why only few multi-purpose WUAs are operating in the region is related to the legal framework. Indeed, not many countries provide a legal framework that enable WUAs, or Federations of WUAs, to receive extra revenues. For example in Turkey there was a lack of a legal basis for forming Federations of WUAs for joint purchase and supply of maintenance equipment or inputs (Svendsen and Nott, 2000). In Egypt, while some BCWUAs could act as service providers for small maintenance works, this was not generalized and only made possible for pilot projects, with an ad hoc provincial decree. In the Jordan Valley, the WUAs enjoyed more flexibility since they were built as entities under the Cooperative Law.

Box 6.7: IFAD case study of Jradou, Zaghouan (Tunisia): Successful diversification of revenues

The GDA of Jradou manages 60 hectares divided into two irrigation schemes (Jradou and Aïn Faouara) each served by a tubewell. Noteworthy in this case is a tradition of social cohesion and mutual trust that enables the organization to expand its activities.

The WUA of Jradou is involved in buying agricultural inputs such as seeds and fertilizers and selling them at preferential rates to members. The WUA is also involved in applying for a loan from a local NGO to provide input loans to WUA members, especially for buying livestock, sheep and cattle or material for making handicrafts. The rate of loan reimbursement exceeds 95%, with 150 beneficiaries in 2010. Other commercial activities include selling irrigation water to other WUAs, selling water to the drinking water municipal company, renting a plot for the deposit of olive residues, exploiting a quarry, running a plant nursery, etc.

The GDA also grants other incentives to farmers, for example prizes for the best sheep breeders and training activities for farmers on topics such as beekeeping, sheep breeding and pruning of olive trees. These trainings have been initiated within the IFAD project.

The board also found a strong incentive for farmers to pay irrigation fees, as only farmers who do not have debts with the WUA can apply for loans. For example, a farmer sold a sheep to pay his irrigation bill in order to be eligible for loans.

The local representative of the Ministry of Agriculture (CRDA) attested that the WUA of Jradou is the only WUA, among a total of 120 (of which 19 were created or strengthened by IFAD project), which covers all its O&M running costs and even unexpected expenditures. The financial report of 2010 showed a net gain of 20,279 Tunisian Dinar (~$13,000). The diversification of activities thus strengthens WUAs by providing a more regular income, not exclusively linked to irrigation activities.

Source: field visit to the PDARI of Zaghouan, Tunisia (2012)

Investment in marketing improvement to ensure higher profit margins for producers is needed to escape from the vicious circle, whereby farmers who cannot make money from irrigation will not pay their fees, WUAs will not be able to take on O&M tasks due to the low rate of collected fees, the infrastructure will deteriorate continuously causing more pressure on the resource, which in return will impact farmers' income. In Azerbaijan farmers and WUAs concluded agreements at the beginning of the vegetation period on the marketing of their agriculture product, which would then also secure the payment of their fees (Rzayev, 2007). This is a solution to escape from the vicious circle. However, WUAs must also have adequate infrastructure and markets, information about price policies of agricultural inputs, energy and outputs to be able to diversify their activities (see Box 6.8).

Box 6.8: IFAD case study in Zaghouan (Tunisia): Necessity of market infrastructure in Tunisia

WUAs and farmers reported the difficulty of accessing markets to sell their irrigated produce, mainly because of a lack of marketing infrastructure (like roads and refrigerators) and the inexperience of farmers. The difficulty of selling vegetables together with a high price for water and inputs put the farmers in a difficult financial situation. Most of them become indebted to agricultural banks and their WUAs; and thus cannot benefit from new loans. The key issue for them is the necessity to improve input- and output- markets.

All WUAs established within the IFAD projects in Tunisia, reported that marketing of irrigated products especially perishable ones was one of their major concern and expressed a pressing need for such services.

An example of successful diversification through the marketing of pumpkin seeds comes from Sidi el Fawar. The GDA there irrigates 44 hectares based on a tube-well system and three separate distribution networks. Six years ago the former president (a retired engineer) contacted the Baddar company which buys pumpkin seeds produced in the scheme. Because most of the scheme is planted with olive trees, whose shade is not favourable to pumpkin cultivation, the scheme area was expanded in a controlled manner, with additional plots duly registered and monitored, and water allocations defined and controlled by the GDA. Although some restrictions in water supply must sometime be implemented, farmers abide by the regulation because they depend on the GDA to market their seeds.

Cultivation, harvesting, and collection of seeds are done in coordination with the GDA which store bags bearing the name of each producer in silos. Their content is transferred (within a maximum of three days) to the company to be washed and conditioned. The rest of the pumpkins is given to cows or transformed in organic fertilizer. Farmers can only be member of the scheme if they adopt micro-irrigation (with 60% subsidies). The system is fully operated and maintained by the GDA, but in case of emergencies, voluntary additional contributions are made. Each farmer is also responsible for maintaining the part of the network in its plot. Meetings at the GDA are quite frequent (~once a month).

After IFAD's intervention yields and irrigated areas have increased, and labour needs have decreased thanks to a better and more predictable water supply. Contracting with the Baddar company allowed for an increase in farmers' as well as in the GDA's income.

Source: Field visits to Zaghouan and Siliana, Tunisia (2012)

The multiple commercial services that WUAs can offer can include fertilizer, pesticide and seed supply, sale and repair of on-farm irrigation equipments, animal husbandry, transport facilities (e.g. refrigerated vehicles), crop processing and storage, marketing, contract farming, loans, incentives, etc. However functional diversification generates its own risks and requires professional management and considerable knowledge of purchasing and marketing practices, but also strong social capital among the members of the WUAs, and transparency in financial

management, with rules and legal frameworks to regulate services and help prevent financial abuse.

Financial management is a very important issue (for more details see Pradhan, 2002b). Most single-purpose organizations already have problems in this area and lack managerial skills. Many factors may govern the effectiveness of multi-function organizations especially the capacity to provide the requested services at the right time and with an attractive price, ensuring farmer's trust and willingness to pay for these services. In conclusion, WUAs need to be fully developed and to possess strong managerial and financial skills before diversifying and expanding their services.

Box 6.9: IFAD's project in Azerbaijan: The need for marketing and credit facilities

The collapse of the Soviet Union destroyed the centralized marketing and credit channels. Experience under the Farm Privatization Project (FPP) shows that the limited marketing possibilities and poor links to markets are impoverishing the rural sector. The farm sector suffers from both a weak demand from local markets (with competition from high-quality imported goods as a result of the expanding oil sector and liberalization of import policies) and the failure to export to international markets. Subsistence production reduces the scope for marketing agricultural produce, limits potential farm investment, and may lead to severe indebtedness. The sector should be helped to improve its competitiveness through increased productivity, better quality and reduced costs. Product processing would also help add value to the production. Establishing farmer organizations and other rural institutions (WUAs, credit unions, etc.) and supporting these through business training, skills transfer and credit would allow farmers to exploit economies of scale in production and marketing and improve their negotiating power both on the market and with the Government.

Source: Country Strategic Opportunities Paper, Azerbaijan(2003)

Box 6.10: The introduction of cash crops in Sudan

"*The introduction of cash crops should be supported: Introduction of cash crop is highly in demand from all farmers and their organizations. Such cash crops include hybrid/high yielding sorghum varieties instead of the local variety aklamoe with limited market options, sunflower, sesame, groundnuts. PCU should commission a study to assess the farming profitability using alternative crop mixes as well as marketing margins. Based on the results of study, the extension service of SMOA will communicate the message to the WUAs and farmers. SMOA and GAS will then assist with marketing promotion. Microfinance should also be used to support the cash crops introduction plans for the farmers. However, given the marketing risks of cash crops, the microfinance portfolio for this activity should be developed cautiously. In this context, warehouse receipts system should be explored by the Project and ABS, to ensure credit supply by mitigating the marketing risks associated with cash crop. Depending on the nature of cash crops which are introduced the possibility of supporting processing units should also be explored*".

Source: Midterm Review Mission (Discussion Paper-Draft) of the GSLRP, Sudan (2008)

6.8 Conclusion

This chapter has reviewed a number of internal factors that determine the performance of WUAs. It has looked at the role of:

- elections, board nominations and political interference,

- social homogeneity and social capital,

- leadership,

- the capacity of WUA staff and commitment of members,

- the origin of the WUA

- accountability and transparency

- diversification and horizontal integration

These factors revolve around basic issues concerning the organizational set-up of WUAs and its structural organization, membership criteria, group dynamics and origin that are also discussed in the literature (see section 3.4) (Jordans, 2001; Hodgson, 2003; Wegerich, 2010).

The chapter emphasizes the need for WUAs to build on an existing organizational basis and social capital, have democratic and transparent organizational structures, recognize informal capacities, relationships and meetings, diversify its revenue sources and horizontally integrate into a wider market.

From an operational focus on internal strengths and weaknesses of WUAs, this chapter has emphasized that in the process of reform these internal factors are strongly associated with external factors. This may enhance but also hamper the development of WUAs. A balance needs to be struck here, since the attempt to increase the WUA's sources of revenue, support and service provision, may also increase its dependence on external sources of financial resources, power and expertise. When external interests start to dominate the internal organizational dynamic, this does not favour WUA's internal accountability, organizational performance and long-term sustainability. Several examples have illustrated this:

- the interference the state official and political bodies in the WUA elections and management
- when strong leadership depends more on external actors such as the state, donors, projects or particular elites than on an authority derived from the constituency of water users
- a strong presence of central governments and bureaucratic agencies in local water management that undermined local competencies and commitment to collective action
- when the WUA is seen to serve the state's interests more than being a farmer-led organization
- the WUA reinforces the status quo and serves interest of existing power groups and its beneficiaries that already have inequitable access to water and other resources
- WUAs remain dependent on external project activities and financial resources, rather than becoming financially autonomous organizations
- the diversification strategy and horizontal expansion into wider markets also implies an external dependence

The dominance of external over internal factors that we have observed in many cases reflects the fact that WUAs are often created or formalized to serve external interests, rather than offering an enabling framework for internal collective action.

7 External factors and policy implementation

It is well identified that the effectiveness of WUAs depends on its institutional environment, how the PIM/IMT is implemented, the attention given to physical rehabilitation, capacity-building, the attributions, tasks and rights of the associations. The external environment also includes the wider waterscape –often a river basin- where water is produced, captured, diverted and conveyed to the head works of the irrigation scheme.

7.1 Legal framework and definition of roles

The legal framework (or the lack thereof) is seemingly a key factor determining the success of WUA development. At least this is an ubiquitous statement in the IMT literature (McCornick and Merrey, 2005; Vermillion 1991; Svendsen and Vermillion 1996; Hodgson, 2007; see Box 7.1 on Azerbaijan, for an illustration). This framework must clearly define the procedures for creating WUAs, their membership, financial autonomy, right to open a bank account, the manner in which activities should be regulated, the rights and duties of each party, the rights to water, the ownership of irrigation facilities, whether economic diversification and revenue generation is possible, etc. It is crucial, for example, to know who is eligible to be a member and, in particular, the situation of those who farm the land but have no legal rights to the land (tenants), ethnic groups, other water users, etc. WUA membership is sometimes restricted to landowners.

Simple and transparent operating rules that everyone knows, understands and accepts are believed to be key to a successful framework (Murray-Rust and Svendsen, 2001). But the legal framework also needs to be flexible enough to allow farmers to adapt their formal organizations to local conditions (Meinzen-Dick, 1997). In contrast we often observe situations where multiple formal institutions overlap and conflict with one another (see Box 7.2, for an example from Sudan).

Box 7.1: Inadequacy of the legal framework in Azerbaijan

"*One of the major reasons for WUAs not to function satisfactorily is the lack of a proper legal framework for the establishment and sustainable operation of WUAs. There is no specific legal framework for WUAs in the current legislation. There are only a couple of references to WUAs in the Law on Amelioration and Irrigation (Law No. 116-IQ, dated June 5, 1996) and others subordinate legislation. The Law on Amelioration and Irrigation makes a provision (Article 24) that farmers could establish WUAs to manage irrigation facilities within the boundaries of the former State and collective farms. However the law provides no detail as to how WUAs are to be established or operated. The only other references to WUAs are in subordinate legislation and these too are little more than passing references. The existing WUAs are in fact companies or, to be more specific, limited liability enterprises established in accordance with the Law on Limited Liability Enterprises, dated December 29, 1998. From a legal perspective they are not 'associations' at all and they are basically free to undertake any kind of lawful commercial activity. The standard model charter, which was developed with the assistance of the FPP (Farm Privatization Project) and has been approved by the Government, would not be adequate for the proposed project. Even if it was to be revised, the fact remains that the limited liability enterprise is not a suitable legal form on which to base the establishment of WUAs*" (Azerbaijan, 2004).

"*An appropriate legal framework was drafted in early 2003 and approved in June 2004. The amended Law on Amelioration and irrigation contains a special chapter, consisting of 15*

articles, regulating the foundation, registration, organization and supervision of WUAs in Azerbaijan. The law also provides for the transfer in use of the former on-farm irrigation systems to WUAs and for the latter to be supplied with bulk irrigation on the basis of long term (20 year) water supply contracts" (World Bank, 2011).

Box 7.2: Unclear roles and responsibilities in Sudan

Confusion over roles and responsibilities is a prominent constraint to the reform process in the Gash area. "*This is the result of the large number of actors (Gash Agricultural Scheme or Gash Development Authority (GAS), Gash Sustainable Livelihoods Regeneration Project (GSLRP), River Training Unit of the Ministry of Irrigation, WUAs , Farmers Union, Mahaliya, Coordinator of the WUAs) compounded with the absence of clarity over roles and responsibilities. One question continuously raised by members of WUAs is: who is responsible for WUAs and if there is a problem where to go? This is complicated by the situation of the GAS itself, and its lack of a clear job description, and the lack of relevant structures to implement the reform process. The boundaries between the WUAs and the Farmers Union are also very confused by the fact that most of the Farmers Union members have several hats, i.e., they are in most instances the leaders of the WUAs, the Block Committee and the very recently established Higher Council for WUAs. The WUAs Coordinator lacks a clear job description and his role and responsibilities are not clear; the institutional link of the job and its relevance within the existing structure of the GAS are not only confused but also questionable*".

Source: Mid Term Review Report of the GSLRP, Sudan (2008)

We may, however, use our sample of countries to revisit the relationship between legal frameworks and outcomes of the reforms. The situation with regard to the legal framework of WUAs in the different countries is summarized in the following table.

Table 1: Legal framework for WUAs in different countries of the NEN region

Morocco	Participatory management of irrigation has its roots within the (often old) community-managed irrigation systems. The Law no 02-84 of December 1990, complemented by an application decree in May 1992 (see details in Appendix volume), specifies the legal status of AUEAs. Their main duties are management and maintenance of irrigation infrastructure, with a heavy emphasis on the definition of financial contribution and commitments to pay. No other activity is mentioned for WUAs, nor what the state provides in exchange.
Algeria	The Law n° 05-12 of 4 August 2005 calls for the inclusion of representatives of the administration, local authorities, and the different categories of users in the management of irrigation schemes. The 3rd article stipulates that the 'different categories of users' need to support the issues related to the use and protection of water resources and water management at the level of the hydraulic unit they are responsible for. Since 2006, a monitoring committee has been created in each large scale scheme to promote participatory irrigation management. In small scale systems, user associations are now a prerequisite to any state intervention in hydraulic infrastructure (Belkateb, 2012).
Tunisia	In Tunisia, WUAs (GDAs) are under tutelage of three ministries (agriculture, finance and interior) which makes their operation a difficult task. Under the Law 2004-24 of March 15 (2004), GDAs are supposed to be financially autonomous and responsible for implementing, operating and maintaining irrigation and water-supply systems. Each GDA is responsible for setting its own budget, fixing the water price and collecting fees to

cover the running costs of WUAs and deal with unexpected expenditures. GDAs can have diversified activities..

Egypt — Initially WUAs 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 (Decree No 14900 of 1995) detailed the rights and duties of the WUAs and WUUs (they can in particular collect fee and enter in contractual arrangements). A similar law for BCWUAs (at secondary level) has long been considered but has not yet been passed.

Sudan — Sudan started experimenting with WUAs in the Abdel Hakam Pilot project from 2000 onwards. With the Gezira Act of 2005, the water management at tertiary level of the Gezira Scheme was turned over to WUAs. In 2010, a policy declaration replaced the Sudan Gezira Board and reduced the role of the Ministry of Irrigation and Water Resources by transferring their responsibilities to a new Gezira Scheme Management Board, which outsources a number of O&M tasks to private companies.

Jordan — Jordan's Water Strategy 2008-2012 specifies that by 2022, "Jordan will have one service provider for irrigation water for the whole country, whereas the retail function for irrigation water will be privatized and/or handled by empowered farmers' associations". After trying a number of informal but traditional forms like the "water council" and "water delegation", associations were formed as "agricultural cooperatives for water users" under the umbrella of the Cooperative Law. This law requires fees and financial deposits before registration. A specific WUAs by-law is required to define their rights and duties; it has been drafted but not passed so far (Salman et al., 2008).

Lebanon — No formal status for WUAs. Existing ones are either informal and managing communal schemes, or set up under particular aid and development projects (either as cooperatives or without legal status).

Syria — Since 1969 the government promoted what it called a participatory system of association management (Kaisi and Yasser, 2004). Recently, the government has adopted a range of measures and polices, aiming at the sustainable development of water resources and the establishment of WUAs, as well as the activation of existing ones. The Presidential Resolution no 31 of the 6 November 2005 defines in the eleventh chapter the WUAs, their responsibilities and the process to be followed for their formation. Not much details can be found about these dispositions and how they are implemented.

Turkey — The transfer of small-scale and marginal irrigation systems was made possible under the Turkish Water Law of the 1950s. From 1993 onwards, most Irrigation Associations (IAs) were formed under the Municipal Law 1580. This implied that they fell under the Ministry of the Interior. After 2000, several law renovations were proposed but not enacted. In 2005, the Local Administration Act 5355 dedicates a special section to IAs. Article 19 specifically mentions the Irrigation Association for the first time in Turkish legal history. 2011 saw the enactment of a new Irrigation Associations Law, which strengthened DSIs supervisory role over IAs by redefining their status from 'local administration associations' to 'public legal entities', subjecting them to an administrative and technical audit and opening the possibility of taking its management back or outsourcing it to the private sector.

Kyrgyzstan — The first legal foundation for WUAs was provided by the 1995 government decree "Regulations on WUAs in Rural Areas" and the 1997 "Statute of WUAs in Rural Areas". The latter regulates the transfer of on-farm infrastructure to WUAs, allows water trading, stipulates bookkeeping and fees, and enables the WUA to impose sanctions in the case

of a breach of regulations. Based on these decrees the “Law on Water User Associations” in 2002 - provided the basis for WUAs to take over irrigation management and infrastructure development (Sehring, 2005; Kazbekov et al., 2009). The first WUAs were created in the mid-1990s with support of the ADB, FAO and the Japanese government and the subsequent rapid country-wide development of WUAs occurred under World Bank and ADB support. In 2000, Kyrgyzstan created a WUA support department at the Water Department of the Ministry of Agriculture. The “well-established” legal and institutional framework of Kyrgyzstan reflects the accepted wisdom among donors at the time, but it is difficult to assess what the practical value is of water trading, infrastructural development and contracts by WUAs and farmers, given their actual financial, infrastructural and water access conditions.

Uzbekistan — The most important legal document in relation to WUAs is the Decree no. 8, which was enacted in 2002. This piece of legislation concerns Agricultural Enterprises in general, but identifies the WUAs as responsible entity for IMT, clarifies who are the water users and what are WUAs, and defines the rules and relations regarding water use. The legal basis of WUA establishment and operation, as well as its rights and obligations are further based on a long list of legislative documents including the Constitution, Civil Code, the Law on Individual Farms and the Law on Water and Water Use, several other laws and a set of Model WUA Bylaws, Agreements and Contracts. There is no comprehensive law specifically related to WUAs, clearly defining them as specific legal non-governmental and non-commercial entities, which weakens their actual organizational status. It is also not clear up to what level of the irrigation systems, WUAs become fully responsible for operation, maintenance and fee collection. In 2006 ADB made a set of recommendations to the government to renew the legal situation of WUAs, but we were unable to ascertain to what new legislation this has led (ADAS, 2006, Sputnikmusings, 2010).

Azerbaijan — WUAs are mentioned in passing in the Law on Amelioration and Irrigation (Law No. 116-IQ, 1996). WUAs were first established as limited liability enterprises established in accordance with the Law on Limited Liability Enterprises, dated December 29, 1998. From a legal perspective they are not 'associations' at all and they are basically free to undertake any kind of lawful commercial activity. To put them under an elected board accountable to members, an amendment to the 1996 law was passed in 2004 (as part of a World-Bank supported project). All WUAs were subsequently re-registered under the new Law.

Yemen — Following the 2002 water Law, a 2011 bylaw defines WUAs/WUGs as “assembly of water users who organize their efforts with the purpose for participation in water resources management and contribution in finance, management, maintenance and operation of water and irrigation projects and structures” which is required ‘to assist NWRA (National Water Resources Authority) in implementing water rules through dealing with a single community based organization’. Other articles strengthen the fact that they are under state authority and do not recognize the self organizing power of local communities. Many types of community organizations exist and varied community initiatives in local water management are observed. Whether formal WUAs will make a difference remains to be seen.

While there is a wide consensus that reforms need to be firmly based on a specific WUA law, it is apparent that a country like **Jordan** has been able to use the existing Cooperative Law to develop partly successful WUAs in the Jordan Valley. Likewise, in the absence of specific status, a few associations were created in **Lebanon** using the status of Cooperative (although it is not reported whether this was suitable or generated constraints). Furthermore the situation in the New Lands of Nubaria, in **Egypt**, (see Box 7.3 and case study in Volume 2) illustrates that most of the tasks that are supposed to be carried out by WUAs are indeed handled by the

Cooperative, which wields more power to make farmers pay for services (see also § 5.3). This strongly suggests that instead of creating new associations, that quickly become dysfunctional, it might have been wiser to make use of exiting Cooperatives and help them widen their attributions.

Box 7.3: IFAD case study in Nubaria, Egypt: Lack of power

Many WUAs have been established at the tertiary level in the New lands of Nubaria, in the western part of the Nile delta. WUAs have no power to apply sanctions on individuals who abuse water distribution, do not pay their subscriptions to the WUA or their electricity bills. Such tasks are normally the main responsibilities of WUAs but, in practice, they are taken care of by/through the Agricultural Cooperatives. The cooperatives clean mesqas, carry out some maintenance work or emergency repairs, pay for electricity expenditures. They then collect corresponding fees from farmers. Cooperatives are able to ensure compliance and repayment from farmers because of their central role in input provision. Farmers need the fertilizers, seeds, pesticide provided by the Cooperatives but also certificates of payment for a number of administrative procedures. This confers power onto the Cooperatives which are in a better position to deliver the services that are theoretically to be delivered by the WUAs.

Source: field visit to the WNRDP, Egypt (2012)

On the other hand countries like **Morocco** can boast a law and a decree issued specifically for regulating AUEAs but the content of the decree can be extremely restrictive and not conducive to either participation or successful WUAs. Indeed the Moroccan decree reads like a detailed list of all the duties and incumbencies these associations have to comply with, with no mention whatsoever of the benefits they would get in return. The law specifies that an agreement must be signed with the state, expressing "*the commitment of the association to mobilize the funds needed to cover all the expenditures associated with the administration of the association, water distribution, and the maintenance and conservation of infrastructures (…) and the obligation to carry out regularly the maintenance works needed to keep all facilities in good working conditions".* It also imposes a so-called "seventh member" in each WUA, who is to be an official.

Likewise, in **Egypt**, the 1995 decree defining the roles and attributions of WUAs in areas of the Nile delta's Old Land reads like a list of obligations of beneficiaries of Irrigation Improvement projects (IIP/IIIMP) and is focused on ensuring O&M operations, cost recovery, and the financial and physical sustainability of the collective pumps and networks (PACER, 1995).

In **Yemen**, the recently passed bylaw on WUAs makes clear they are under state authority and does not emphasize or delineate their power and authority. If properly empowered they might play a role in local groundwater management, but in the opposite case it is not clear whether they will add something to, or allow to enhance, the initiatives taken by different communities to tackle overexploitation (van Steenbergen et al., 2012).

The 2011 bylaw defines WUAs/WUGs as "*assembly of water users who organize their efforts with the purpose for participation in water resources management and contribution in finance, management, maintenance and operation of water and irrigation projects and structures*" which is required "*to assist National Water Resource Authority in implementing water rules through dealing with a single community based organization*". Other articles strengthen the fact that they are under state authority and do not recognize the self organizing power of local communities (van Steenbergen et al., 2012).

In some other contexts, there might be a reluctance to issue a law that would be conducive to transferring too much power or autonomy to non-state parties. It can be hypothesized that is probably one of the reasons why the Law on secondary-level WUAs has never been passed in

Egypt; and why the law in Turkey has only very recently been issued. It is somehow ironic that Turkey, once branded as an IMT success story, did not issue any specific law during 20 years. The text voted and approved in 2010, instead of asserting the autonomy of WUAs, seem on the contrary to reinforce government's control over the associations, giving it in particular the right to re-takeover or privatize the areas managed by non-performing WUAs (Ozerol, 2012).

Another important dimension of WUAs is whether they are legally allowed to perform other activities than their core business and therefore generate income from other sources (see earlier discussion on horizontal expansion in § 6.7). To the best of our knowledge (and with the limitation that it was not possible to gather versions of all legal texts) this seems to be quite a rare instance. The decree on the GDAs, in **Tunisia**, is quite open, and more clearly provides for the possibility to develop other activities, for example with regard to buying input for farming or to marketing. For some reason, however, these dispositions are not well known (and many think this is actually not allowed).

Another important legal aspect of WUAs is whether they are allowed to hire staff, which is also not always clearly spelled out. For example, Freitas (1996) notes that, in **Morocco**, Article 29 entrusts the elected council with implementing the decisions taken by the Assembly, establish budgets and submit them to the General Assembly, and to nominate agents and establish the conditions of their function ("traitement"). It does not clearly spell out that it has the right to hire and dismiss employees.

In Central Asia, the legal framework for WUAs is either based on a new comprehensive law or on multiple existing laws. Donors promote and support the first option for the sake of clarity and legal security of WUAs, yet donor influence does not always lead to practical legal solutions. The "well-established" legal and institutional framework of Kyrgyzstan clearly reflects the accepted wisdom among donors at the time, but it is difficult to assess what the practical value is of water trading, infrastructural development and contracts between WUAs and farmers, given their actual sub-optimal financial, infrastructural and water access conditions. In Uzbekistan, the legal basis of WUA establishment and operation, as well as its rights and obligations are based on a long list of legislative documents. There is no comprehensive law specifically related to WUAs, clearly defining them as specific legal non-governmental and non-commercial entities, which weakens their actual organizational status. It is also not clear up to what level of the irrigation systems, WUAs become fully responsible for operation, maintenance and fee collection.

7.2 The predictability of water supply

The, perhaps, most crucial aspect of successful co-management in large-scale scheme is frequently, and conspicuously, given limited attention. This is perhaps a reflection of the fact that IMT policies tend to be primarily focused on the physical and financial sustainability of the schemes and of WUAs, and somehow less by water management itself. Indeed the quality of the supply of irrigation water at the *interface* between the agency and farmers strongly governs the possibility of developing collective arrangements for sharing water within the downstream area that is under the responsibility of WUAs. Collective action cannot develop around a resource whose supply is too unpredictable and variable. The predictability of water supply is a major factor determining the success of irrigation management. As Depeweg and Bekheit (1997) argue, a system with reliable but inadequate water supply will be more desirable than a system with an adequate supply but in unpredictable way.

While the blame for the failure of WUAs, or low distribution efficiency, is often placed on farmers, this conveniently deflects the attention from the kind of 'service' they get and obscures the fact that, often, "*central officials remain remote from the problems of local control and*

farmers are too often left in a debilitating organizational vacuum or, equally bad, in capricious organizational settings where the only norm is unpredictability" (Freeman and Lowdermilk, 1991).

Accordingly the literature does not offer much estimate, and even mention, of the quality of supply. Gunchinmaa and Yakubov (2010) considered this indicator in Central Asian countries, Kuşçu et al. (2009) in Turkey, Ezzat El-Agha (2010) in Egypt, Adam (2003) in the Gezira scheme in Sudan. Except for this latter case, the data point to un-reliable irrigation scheduling and thus un-satisfaction of farmers with regard to the timing of water supply and the adequacy between demand and supply.

Likewise water managers in the Nile delta in **Egypt** have so far failed to establish continuous flow in secondary canals (who are traditionally managed on a rotation basis) (see El-Kassar and El-Fotouh, 2008; Ezzat El-Agha, 2010). 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. It was also the most attractive feature of the IIP project for farmers, who saw the prospect of a continuous supply and the end of water shortages, and rightly seen as "important to assure the success of the [IIP] project" (Metawie, 2002)(see more in the appendix).

In **Tunisia**, Frija (2009) showed that farmers were willing to pay higher water fees if they could have more reliable supply or transferable irrigation rights. However, the issues related to the agency's responsibility to deliver the water needed by WUAs and to the interface through which managers and WUAs can exchange information and coordinate their action are often left unattended. We will go back to this crucial point in the next section.

Typical gravity irrigation schemes include a primary and a secondary level under full control of the agency, a tertiary level that is often left partially or fully to farmers (but not always) and a quaternary level (farm ditch or small group of farms) managed by farmers. But there are many situations where distribution to farmers requires some pumping operation(s). The role, position and size of the pumps may vary; four situations can be distinguished (Figure 4).

A first peculiar case is that of the Nile delta in Egypt. Water is distributed through a maze of 40.000 km of waterways ramified down to the mesqa, a tertiary-level excavated open canal. Farmers use individual pumps to abstract water from mesqa (and from drains) and convey water to their fields through a quaternary called marwa, which can serve either only one farmer (e.g. when his fields are located along the waterway) or a group of farmers (in which cases several individual pumps share the pumping bay where water is abstracted to fill the marwa) (see Figure 2). Each farmer operates his pump in turn and delivers the water to his own field.

Figure 3: Individual pumps in the Nile delta

A second situation occurs when groups of farmers along a same tertiary share a collective pump. A typical case is that of the Bustan-extension and Tiba projects in the New Lands of the western delta in Egypt. The design adopted in these areas includes electric pumping stations that serve 8 ha units allotted to 4 or 8 farmers.

Further aggregation of farmers at the tertiary level leads to bigger pumping stations which can deliver water to several valves (like in Egypt's IIP project, where they supply water to *marwas*), or under pressure down to individual farmers (with a connection to sprinklers or drip farm-level systems). This is also the case in Canal 900 scheme in the Beqaa valley, Lebanon. The (main) 'Canal 900' has no real secondary branches and merely supplies (by pumping) a number of elevated open reservoirs (4 at the moment), from which water is redistributed under pressure to areas of around 150 ha.

Last it is possible to aggregate farmers at the secondary level, where they are supplied by a larger pressurized network, as can be seen in the Jordan valley for example. The management of pressurized systems over several hundreds hectares of land is not as easy as sometimes believed. What one farmer gets usually depends on how many other farmers irrigate (and how) and it is therefore also necessary to implement turns.

These different configurations come with quite different management and organizational needs, and correspond to different interfaces between the agency and farmers. If the pumping stations are to be under the control of the farmers then the size of the area served by the pump matters. In the first case, farmers are fully independent; as the area grows, collective action requirements also increase, not only because of the size but also because of the growing complexity of operating a pressurized network while maintaining a more or less homogenous pressure. On the other hand, as the area served by the pump and managed by farmers grows, the point where water is sourced also goes up higher in the system. This means that the area under control of the agency is reduced, but also that uncertainty in supply will be more easily controlled. In the fourth situation, the agency only has a main canal to manage. In the Jordan Valley, supply of water in the canal is continuous and ensured by a dynamic regulation system. In other words the burden of ensuring coordination across levels shifts from the agencies to farmers; more control comes at the cost of more collective action.

From the point of view of farmers the first situation is optimal *if* the agency is able to ensure delivery of water down to the plot level. If the distribution network becomes dysfunctional and/or available supply drops under demand, then this is the worst situation. It is interesting to note that the design used for the expansion of irrigation in Egypt's new lands (in Nasr canal) was initially of the third type. But because of management problems within the area served by the pump the design was changed to the second type. It is interesting to note that in the old lands an opposite change has been favoured, whereby individual farmers are obliged to group at the tertiary level and to share a collective pump. As mentioned earlier many interventions do not factor in the cost of collective action and assume that, because it is in their interest, farmers will naturally organize. An assumption that often proves painfully wrong.

Figure 4: various types of mixed gravity-pressurized irrigation distribution schemes

7.3 Early participation of users in projects

The way IMT reforms are planned and implemented has a strong bearing on their outcomes. For example, several studies provide ample evidence of the need for an early involvement of farmers and their organizations in the process of IMT/PIM, particularly in large-scale irrigation systems where farmers traditionally have limited involvement in the management of water beyond the farm gate (e.g. Osmani, 2001; Hamdy, 2007; Hussain, 2007; Kuper et al., 2009; Hamada and Samad, 2011).

Bergh (2007) (evaluation of IFAD's project in the Mountain Zones of Al Haouz Province in **Morocco**) and Pant (2008) showed that lack of openness in the preparation of development plans and planning phases, as well as project implementation, was an main impediment in the successful execution of IMT/PIM programmes. Indeed, these programmes were apparently not widely discussed nor shared with farmers' representatives, farmers' points of view were not incorporated, and works were usually undertaken without any involvement of local representatives. Thus, technical design must be conducted in a way that it is effectively responsive to farmers' concerns and knowledge of the terrain.

In **Azerbaijan** the rehabilitation works carried out as part of the strengthening of WUAs (World Bank, 2011) have been designed with the contribution of farmers and has led to a high level of satisfaction.

In contrast, the PAGI project, the Programme d'Amélioration de la Grande Hydraulique, funded by the World Bank in **Morocco**, was conditional upon the establishment of WUAs. This was done on paper but most of these WUAs remained dysfunctional or non-existent, partly because of the non-implication of farmers in the design of both infrastructural and institutional interventions, partly because of the lack of interest by managers (Field visit to the DR of Taourit-Taforalt, Morocco, 2012). Belghiti (2005) acknowledges that "the integration of human dimension in the design of the projects makes them sometimes more difficult and costly in time and effort because it is complicated in term of choice of standards design and of process of implementing. But the integration of human dimension and PIM as of the design step of the projects, give them more chance of success and of durability".

IFAD interventions in Tunisia and Azerbaijan (see Box 7.4) were also negatively affected by the lack of early involvement of beneficiaries. It can be hypothesized that the failure of many interventions and development of projects in involving beneficiaries is related to the tight time-farmers imposed at the beginning of projects: works on the ground (excavation, earth-moving, etc) are more quickly initiated than institutional interventions, especially when there is no earlier experience and trained people in the area, which creates a disconnect between the hardware and software components of the project.

Box 7.4: Early involvement of beneficiaries lacking

In IFAD interventions in Siliana, **Tunisia** (PDARI: 1997-2005), the evaluation report of May 2004 identified the weak implication of farmers in the design and planning of technical intervention, together with the limited capacity-building and technology transfer, as the main impediment to establishing a gradual take-over of maintenance by farmers and a sustainable management of the works carried out by the project.

Source: Intermediary evaluation of the PDARI Siliana phase I, Tunisia (2004)

Box 7.5: WUAs' participation in **Azerbaijan**

"*Farmer participation in irrigation rehabilitation works is the key for successful establishment of sustainable Water Users' Association. Rehabilitation works should be implemented in coordination with the activities of establishment of WUAs. The project implementation should be planned to address this need, and the project organization and management should be set up to ensure proper coordination during the project implementation period.*

The Water Users Associations must be formed first, and used as the main vehicles for ensuring beneficiary participation in the project activities. The rehabilitation works should be in response to their request and be contingent upon their participation in all stages of planning, design, construction supervision and eventual system transfer"

Source: Lessons learned, Midterm review of the NEDP, Azerbaijan (2009)

Bergh (2007) also observes this problem for participation in **Morocco**, where project implementation is done through contractors. Although villagers have to 'participate' "*the contracting companies feel obliged to take on the works that were supposed to be carried out by the population in order to avoid problems of quality and time delays. Contracting out also means giving less responsibility to the populations, and results in a lack of 'ownership' of the project on their part, with all the negative implications in terms of sustainability*". More generally "*the main constraint to participatory project planning is time: the normal project cycles of four to five years are not enough to ensure the necessary amount of interaction, trust, and knowledge of the local communities to plan and implement sustainable projects*".

In **Egypt**, WUAs have been established at both the secondary and tertiary (mesqa) levels and confusion has been observed where they overlap: 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. 1998). There has also be discussions about the timing of establishing WUOs, mesqa WUAs being established before, at the same time, or after BCWUAs (World Bank, 2005) according to different sources. 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), while still others promote establishing "water user organizations at the branch canal level, allowing for eventual expansion to the district level" (IRG, 1999).

7.4 Capacity building and training

Capacity building and training of both agency and WUAs staffs/members have also been widely proved to be essential steps to creating and strengthening WUAs. Commonly, PIM/IMT programmes provide training and other complementary activities to managers and/or WUAs staffs during project intervention; but it should be part of a long-term programme that eventually evolves into a consultative, problem-solving process. When programmes morph into long-term government policies then a special agency is often created to take care of supervision and training of WUAs. For example the Irrigation Advisory Service (IAS) was created in Egypt to spearhead the creation and training of WUOs following the mainstreaming of the IIP project (see Appendix on PIM in Egypt). In Azerbaijan, District (Raion) level Support Units (RSUs) have been set up under the auspices of a Central Support Unit (CSU) located within the AIOJSC (Amelioration and Irrigation Open Joint Stock Company), the agency in charge of bulk irrigation water supply, and development and management of irrigation and drainage systems throughout the country. In several countries supervision structures are weak or have limited staff and cannot attend to the needs of WUAs (see case in Tunisia in Box 7.6).

Training and awareness building firstly concerns the decision-makers and the managers in the agency. At one level, there is a need to convince those who could stand to lose out from the reform or would tend to favour the status quo. In **Egypt** no efforts were spared in trying to convince the rank and files of the ministry of the desirability and inevitability of the reform. Numerous 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, trainings and lobbying efforts helped to provide the "bureaucratic orientation" required (Aziz, 1995). Turkish officials were also taken to Mexico and the US, while managers in Azerbaijan visited Turkey and Egypt (World Bank, 2011). At a more pragmatic level, managers need to adhere to and fulfil their new roles and need training on how to work with farmers in a participatory way, in addition of knowledge on the reform proper and its implications for their daily work. In Turkey the agency staff within the DSI was trained to acquaint themselves with new field requirements and the approach to be used when embracing their new role of supporting and working with WUAs (Svendsen and Nott, 2000; Murray-Rust and Svendsen, 2001). It is obvious, however, that emphasis on 'training' works to occult the fact that resistance to reform by officials is in general not related to a lack of understanding and has deeper roots (see § 8.4).

Box 7.6: Capacities of regional authorities of the Ministry of Agriculture (CRDA) in Tunisia (IFAD case study in the PDARI of Siliana and Zaghouan, Tunisia)

"*The data provided by the offices in charges of GDA within the CRDA were grossly incomplete because these offices have neither the staff required (two technicians to take care of 120 GDA in Zaghouan) nor the competences (the person in charge of GDAs in Siliana CRDA was newly recruited) needed for supporting, monitoring and supervising the GDAs placed under their responsibility*".

Source: field visit to the PDARI of Siliana and Zaghouan, Tunisia (2012)

WUAs' staff usually has to handle a lot of new activities for which they often have little ability, although this varies with the historical background and educational level of each locale. Often the main key area for training (as expressed during the case studies' field visits) is the financial area. Training of WUAs staff, especially the treasurer/accountant in the field of financial management, is fundamental to WUAs' success. Tasks like collecting, recording and updating membership registrations and irrigation service fees, donations and fines; keeping and issuing receipts; preparing monthly accounts; preparing seasonal and annual statements of accounts; and preparing annual and seasonal budgets require some financial abilities to be carried out properly and regularly.

Others required skills to be acquired by WUAs' staff would include human resource management; planning; determining water requirements; irrigation planning and scheduling; maintenance management; communication and liaison with water users; WUA staff duties and responsibilities; accounting and book keeping; budgeting; fee setting; principles and practices of service provision; cash flow; support service provision… (see Pant, 2008; Burton, 2010). While the wide number and the diversity of tasks indicates that training of farmers is necessary, it is however not a sufficient condition for successful management (Mukherji et al., 2009).

Box 7.7: Inadequacy of training activities in Sudan

"*The training contents provided WUAs members looks problematic and irrelevant as it focuses principally on technical issues relating to water management rather than being framed within a holistic approach of empowerment that recognizes the WUA as an institution with diverse capacity building needs and requirements.*

In addition focus of training on theoretical issues provided through lecturing render most of the trainees, who are mostly illiterate, ready or capable enough to follow the training and to benefit

from it. This also creates problems of poor communication and dissemination of the acquired skills and knowledge to their constituencies. The failure to make use of the relevant training tools and methodologies including audio-visual techniques is a major setback in the training undertaken. The training allowance, as argued by some participants in the training, is probably the main motivation and end objective for some participants to attend the training sessions".

Source: Mid Term Review Report of the GSLRP, Sudan (2008)

7.5 Rehabilitation/status of the hydraulic infrastructure

Another essential condition for successful PIM/IMT is the status of the infrastructure. This is due to two reasons. First if the maintenance burden is partly or fully transferred to farmers, the 'gift' of IMT is basically tantamount to asking farmer to pay for earlier delayed maintenance. Second, management of a dilapidated network is uneasy and makes it hard to ensure a minimum degree of efficiency and equity in supply. The hydraulic infrastructure should be in fair condition allowing an affordable and reliable water supply.

This was an obvious pre-condition in the establishment of WUAs in the **Jordan** valley, where each of them is in charge of a pressurized system of several hundreds of hectares. Rehabilitation of the system prior to the transfer of responsibilities to WUAs included physical changes in the system (retrofitting pipes, changing meters, flushing pipes, improving the filtering process, detecting and repairing leaks, etc…) to ensure a better uniformity of pressure (in particular to higher level plots) (Salman et al., 2008; Regner, 2012).

In contrast, handing over poor and degraded infrastructures to farmers is a sure recipe for failure. Infrastructural problems can be inherited from the governmental agencies (e.g. the case of the Bergama irrigation scheme in **Turkey** (Uysal and Atışa, 2010), or Azerbaijan (Rzayev, 2007).

In **Egypt**, setting up Branch Canal (secondary) WUAs involved several steps, including obtaining legal authority (by decree), developing the association by building local management skills, including financial accounting, establishing an agreement between the Ministry of Water Resources and Irrigation and the BCWUAs regarding the activities that each would perform, rehabilitate the system to a mutually agreed level, before, finally, transferring the local management and maintenance of canals and drains to the BCWUAs (IRG, 2002).

But rehabilitating the infrastructure is not enough. The quality of the execution is essential and should not be taken for granted. Azerbaijan (cf Box 7.8) and Egypt are good examples.

Box 7.8: Poor quality of rehabilitation: Azerbaijan

"*Particular attentions should be paid to the quality of the design and construction standards, materials and workmanship of the irrigation system to avoid expensive repairs and remedial works, later. Poor quality of construction is associated with loss of production and lack of interest of the beneficiaries to form WUAs and assume responsibilities for operation and maintenance of the system*".

Lessons learned in Azerbaijan (IFAD midterm review, 2009)

In Egypt's rehabilitation of *mesqas* (IIP and IIIMP projects) contracting procedures and contractor performance have remained a strong concern up to these days. "*Contractor non-performance not only caused project delays but seriously undermined farmer confidence in the IIP and its abilities*" (IRG, 1998a). 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 the works 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.

Box 7.9: Deterioration of the state of irrigation infrastructure in Azerbaijan

"*A recent survey of project areas of the International Development Association (IDA) funded Rehabilitation and Completion of Irrigation and Drainage Infrastructure Project found that around 80% of the infrastructure has been deteriorating in some form and needs urgent attention. The lack of maintenance has a serious impact on overall water use efficiency, which is estimated to be no more than 30%. This low efficiency requires large water abstractions, which increases the entrance of sediments into the systems and leads to over-irrigation and its harmful effects on yields as well as water logging and salinity. As funds for adequate irrigation and maintenance were not available, the area irrigated and agricultural production decreased.*

In addition, the deteriorated infrastructure and the on-farm management vacuum have led to inadequate and inequitably distributed water supplies. In most cases, the margins of the systems are no longer irrigated and service on the lands still under irrigation is erratic. Influential farmers often receive priority access and conflicts are becoming more frequent".

Source: Appraisal Report of the NEDP, Azerbaijan (2004)

8 Participation to / transfer of / *what*?

Echoing the reflexion on the PIM-IMT continuum discussed in section 5.2, this chapter attempts to revisit the different cases reviewed and to synthesize the information given. It is abundantly clear from the diversity of cases that the different WUAs encountered are actually very different 'beasts'. This reflects the varying degree of participation and empowerment that is constitutive of the PIM-IMT continuum itself but also a diversity of arrangements at the interface between managers and farmers, the multiplicity of financial architectures that strongly govern the sustainability of the scheme, as well as the structure incentives that links actors together (or not). We first reflect here on the hypothetical balance of costs and benefits, as perceived by farmers, and its implication for the success of IMT. We then examine how participatory water reforms in the countries of the region fit in the regional PIM/IMT spectrum, the diversity of financial arrangements, and the relationships between the wider political economy context and the policy process.

8.1 Cost-benefit balance and incentives

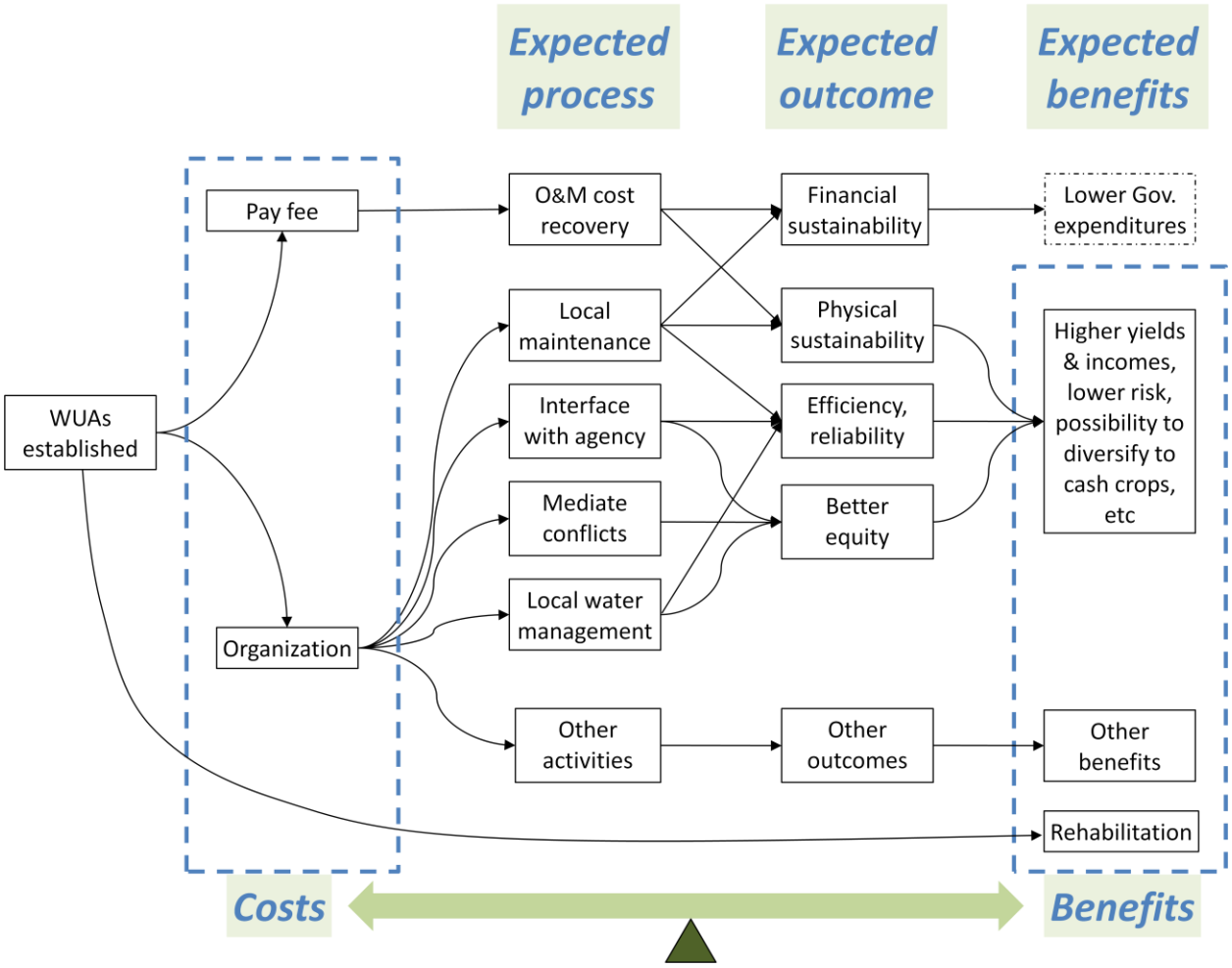
PIM and IMT policies are institutional processes whereby the roles, responsibilities and their associated costs and benefits are redistributed among the actors. It is therefore pertinent to look at the array of costs and benefits accruing to farmers. Meinzen-Dick (1997) noted that "*the initial success and sustainability of WUAs was found to depend largely on the provision of sufficient incentives, or gains, for farmers*". Technical interventions and physical improvements to irrigation systems (rehabilitation) and, for example, access to credit provide short-term incentives to farmers. But long-term incentives should include improved water management through transparency of water distribution, reliable water service and accountability, representation at higher levels of water management, reduced conflicts, ownership of the irrigation system, intensified agricultural production, increased incomes and household food security **(**Meinzen-Dick, 1997; Sehring, 2005). Such benefits are not always 'tangible' and may also vary from year to year, influencing the long-term perception and judgement of farmers of the PIM/IMT policy.

Figure 5 attempts to summarize how, in theory, a reform should translate into a stream of benefits. The establishment of WUAs comes with two major injunctions for farmers: the need to *organize* and the need to *mobilize* their own resources, in kind (e.g. voluntary labour) and cash (through an ISF: irrigation service fee). These two injunctions are clearly a cost to farmers. This is obvious for the latter but, unfortunately, not well recognized for the former. There is an implicit hypothesis that self-organization is more or less costless, which is of course a gross neglect and misunderstanding of the transaction costs that comes with collective action. These costs are particularly high, as illustrated earlier, for situations with low social capital and uncertain water supply.

What do we have on the benefit side of the scale? Better maintenance of infrastructure (through both financial and in kind contribution, but also –possibly- participation in the planning and execution of related works), as well as better coordination between managers (supply) and farmers (demand), are likely to result in an increase in efficiency and reliability of supply. Conflict mediation and local water management by WUAs should also result in more equitable distribution. All these outcomes should translate in concrete benefits to farmers in terms of yield increase, lower risk, possibility to diversify out to cash crops, and ultimately higher incomes (see Figure 5). This must be seen at the aggregate level, because it is also possible that restoring equity chiefly works for those at the tail end of the canal and/or with poor access, while some

farmers with secure and preferential supply may not see their situation improved. (This heterogeneity in situations is precisely what is often forgotten and what may work against successful collective action). To these expected benefits to farmers, one should add the benefits of the rehabilitation that comes with the reform (if this is the case).

Figure 5: The balance of costs and benefits in PIM/IMT reforms, as perceived.



It is apparent that most reforms are launched based on unrealistic assessments of the costs (underestimated) and of the benefits (overestimated). When the former end up offsetting the latter then the whole process of collective action is undermined and quickly annihilated. Governments, on their side, tend to focus on their perception of the benefits (reduction of state expenditures).

We have discussed a number of issues why the expected processes and outcomes are often not forthcoming, jeopardizing the policy reform. They include the difficulties faced by both levying substantial fees and instilling collective action within WUAs and that make the expected processes highlighted in Figure 5 not unfolding as planned : the recovery of fees will be more difficult than planned (§ 5.3), especially when benefits are not materializing, local maintenance may face difficulties in mobilizing labour, an association set-up by the state may not have the legitimacy to mediate conflicts or to curb free-riding (practices (water thefts, 'ghost pipes' that are 'clipped' on underground main pipe adductors, etc), and the agency might not demonstrate

any willingness to really empower farmers and co-manage the scheme with them. This explains why the 'expected outcomes' shown in Figure 5 do not materialize to the extent that would make the associated concrete benefits large enough to instil adherence of members to the reform.

As discussed by Freitas (1996) it is very difficult to shift from a situation where the state agreed to maintain the scheme and deliver water against a water fee, to one where additional financial and organizational efforts are requested against, at best, no change in water supply, and often decreasing supply because of the growing imbalance between supply and demand in some schemes.

8.2 Institutional settings and state agencies' commitment

As discussed earlier, there is often little clarity on what the precise attributions and duties of the different parties are, whether the policy is advanced under a PIM or an IMT banner. Even for Turkey, once celebrated as a success story of IMT, and for which there is a substantial literature, it is hard to find details on what is really transferred and how.

Based on our earlier discussion on the degree of transfer, as seen through three areas of responsibilities and two levels, we revisit here the countries with large scale public irrigation schemes and distinguish between those which are closer to IMT (Turkey, Jordan Valley, Azerbaijan, Kyrgyzstan) and those which display a participatory rhetoric, with varied degrees of achievement (Egypt, Morocco, Uzbekistan, Sudan, Tunisia, Lebanon, Syria, Algeria, Yemen).

8.2.1 Cases of (partial) IMT: what contracts between agencies and WUAs?

We review here the four countries where some degree transfer has been effective and examine what are the attributions of both farmers and the agency, and how they are made explicit or contractualized.

In **Turkey,** and similar to Mexico, transfers are based on three sets of legal documents: a transfer agreement (contract) between the DSI and the IA, a protocol which identifies the conditions of the transfer (Kadirbeyoğlu, 2008), and by-laws for the IAs. The transfer agreement makes the IA responsible for all the O&M services related to specified irrigation facilities at the secondary or tertiary level and for recovering the service costs of this service provision (Kukul et al., 2008). The contract mentions the supply source (main canal and associated infrastructure) (Döker et al., 2003), but does not mention any specific water allocation or specify the conditions and details of the infrastructure that is transferred.

IAs are set up as non-profit organizations using a legal patchwork of local and regional government and cooperative law (1580, 442, 5442). This legal shopping was not considered ideal and several attempts were made at a new law specific to IAs. However, it took until March 2011, almost two decades after starting the accelerated transfer, that this 'Enabling Law' was promulgated. More than an enabling requirement for transfer, this law actually stabilized and legitimated a set of institutional relations that was the product of the transfer process.

The IAs consist of two governing bodies: The General Assembly, consisting of local authorities called muhtars from the area. This Assembly elects an Executive Committee, consisting of a chosen president, four executive committee members, a general secretary (agricultural engineer), who steers the association's daily operation, and an accountant. The Executive Committee presents its work plans, budgets and accounts to the General Assembly for approval.

DSI and IAs share the operating responsibilities in larger systems (Yazar, 2002). DSI operates the head works and the primary canals which serve several IAs and take a lead in planning the annual irrigation calendar. IAs distribute water below the secondary canal, maintain canal

infrastructure and collect fees in their zone (Yazar et al., 2006; Kadirbeyoğlu, 2008). IAs identify the total water demand at the start of the season for the DSI, which then allocates the amount of water from the reservoirs (Kadirbeyoğlu, 2008). The IAs schedule and deliver water to water users in their zone (Yazar, 2002), usually through a rotation system among tertiary canals and a distribution ranking among farmers (Kadirbeyoğlu and Özertan, 2011). Irrigation fees constitute the bulk of the WUA revenues, and the fees are set by each WUA and vary according to the crop and the area that is cultivated (Yazar, 2002; Kadirbeyoğlu and Özertan, 2011).

DSI gradually transfers the responsibility for the maintenance of the secondary and tertiary infrastructure to the IAs. The pace depends on the developing capacity of the IA to take over maintenance, determined by the employment of technical staff, training, equipment and financial resources. IAs make use of DSI maintenance machinery, but can also acquire their own machinery, which was supported by a World Bank loan of 1997. Ideally, all maintenance and repair responsibility is devolved to the IAs.

The Irrigation agency (DSI) remains committed to transferred schemes and active in continuous monitoring, identifying required improvements and providing assistance to users in all related aspects, including assistance in acquiring and maintaining required skills and consulting and technical support when needed; regular technical training of the staff of WUAs on different aspects of irrigation; assistance in obtaining essential O&M equipment and handling urgently needed repair or rehabilitation works on the basis of reasonable repayment or cost sharing arrangements; and legal procedural and organizational changes concerning both the WUAs and relevant Government agencies and taking appropriate action (Tekinel, 2004). Dadaser-Celik et al. (2008) reported that the majority of farmers think that WUAs are better at irrigation management than the DSI.

Hence, the legal framework clearly demarcated the rights and responsibilities of the IAs (Yercan et al., 2004; Uysal and Atiş, 2010), but did not always clearly specify to **the-transfer-of-what** exactly the state committed. For example, in the present circumstance, IAs identify the total water demand at the start of the season for the DSI, which then allocates the amount of water from the reservoirs (Kadirbeyoğlu, 2008). The transfer agreements fail to specify the bulk allocation or water entitlement of individual IAs and also the details and conditions of the operation, maintenance and administrative facilities that were transferred (Dadaser-Celik et al., 2008; Kukul et al., 2008; Kibaroglu et al., 2009). "*Ownership of facilities is not transferred to the WUO and remains with the state. Likewise because of the loosely defined character of Turkish water rights, there is no conveyance of any formal right to use water to the WUO*" (Kodal et al. 2005).

The IAs were set up by local authorities with DSI support (Kadirbeyoğlu and Özertan, 2011). The General Assembly of the IA is composed of municipal and village leaders (*muhtars*) and democratically elected members of municipal authorities within the irrigation system. For the governing body they elect a chairman and four executive committee members. Together with an assigned general secretary (an agricultural engineer) and an accountant, the body consists of seven members (Tekinel, 2004). At every regular general assembly, which consists of local authorities, the chairman and the board of directors present their account for approval and the technical and managerial issues are discussed for water tariff setting. IAs are non-profit organizations which range from 300 up to 35 000 hectares. If an irrigation system serves more than one region or village, it is generally transferred to the IAs formed by the municipalities of these villages (Tekinel, 2004). The most striking feature of these original legal provisions and organizational structure for the IAs is that there was no direct water user representation in the transfer process and the irrigation management. Their only recourse was the five yearly elections of muhtars (Kibaroglu et al., 2009).

Several legal complications have influenced the formation of IAs. These user organizations were originally established in majority under the Municipal Law No. 1580. This legal solution

was considered convenient although not entirely appropriate, because it made IAs accountable to the Ministry of the Interior. This Ministry did not necessarily possess the appropriate technical expertise to supervise the IAs. DSI officials (and WUAs) started to regret this 'patchy legal foundations' (Kadirbeyoğlu and Özertan, 2011) and the plea for a new law, specific to make IAs sustainable, was frequently repeated in the literature (Vidal et al., 2001; Çakmak et al, 2004; Kadirbeyoğlu, 2008; Uysal and Atiş, 2010). Several drafts of this law were circulated, presented and discussed during the last decade or more. In 2001 a proposal was debated but not accepted. In 2005, the Local Administration Act 5355 incorporated a special article 19 that specifically mentions the Irrigation Association for the first time in Turkish legal history (Özerol et al., 2013). The IAs acquired the status of local administration associations but remained under the Ministry of Interior. In March 2011 a new Irrigation Associations Law was finally enacted. Amongst others, this law reinstated DSI as the dominant public water authority that acts as an 'advisory and controlling institution' to IAs (Uysal and Atiş, 2010). The Law redefined the IAs' status[7]:

- from 'local administration associations' to 'public legal entities', implying more government control
- subject to an administrative and technical audit of DSI, i.e. not the Ministry of the Interior
- in case of not meeting standards or good management practices, DSI can recover the management of IAs and either exercise this itself or outsource it to the private sector.

A DSI official summarised the position of the IAs: "They were rambling, since there was no coherent legal setting for them and they had no connection to the Ministry of Interior. Now we will monitor them and make sure that they do the things right; otherwise we always have the right to sell the irrigation canals to private companies" (Özerol et al., 2013).

In **Kyrgyzstan**, the first WUAs were created in the mid-1990s as part of pilot projects with the support of the ADB, FAO and the Japanese government. The subsequent country-wide development of WUAs was part of rehabilitation and canal improvement programmes of the World Bank and ADB. In 2000, Kyrgyzstan created a WUA support department at the Water Department of the Ministry of Agriculture. This agency provided training and helped WUAs to register, set up their budget, and make contracts on water with farmers and the RayVodKhoz (District Canal Management Organization; CMO). The WUAs were set up under the 1995 government decree "Regulations on WUAs in Rural Areas" and the 1997 "Statute of WUAs in Rural Areas". Based on these, the "Law on Water User Associations" was promulgated in 2002 (Sehring, 2005).

The Canal Management Organization (CMO) jointly operates the larger irrigation systems with the WUAs. Prior to the irrigation season, WUAs collect the necessary information on cropped area and cropping patterns and calculates the seasonal water requirements of the network under its control. The WUA manager then submits the water plan to the CMO. The CMO reviews the requested requirements against the water availability in the reservoir and makes necessary adjustments in the water plan for the cropping season. These adjustments to limit water supply are particularly important for periods of droughts and water deficiency when demands exceed available water. The requested amounts in the plan are reduced proportionally by a specified coefficient set by the Ministry of Agriculture. Adjusted plans are approved by the CMO and serve as the basis to sign seasonal water delivery agreements between the CMO and WUAs. The CMO is responsible for supplying water to the WUA during the season taking into account the demand in relation to the capacity of the canals and actual requests made by individual farmers or water user groups (WUGs) (Kazbekov et al., 2009).

[7] *We thank Gül Özerol for this information about the new law.*

Nevertheless, the contracts between a WUA and the CMO do not specify a bulk allocation. It is difficult to determine in advance the exact amount water needed (it may be less in a year with lot of rainfall; it might be more in a dry year). Because many WUAs order more water to be flexible, the contracts are subject to frequent changes. So factually much water delivery takes place on the basis of oral agreements. Even though Kyrgyz farmers are involved in water allocation decisions, they do complain about having to pay an ISF, without any guarantee to receive the amount of water stipulated in the contract (Ul Hassan, 2004).

Maintenance at the primary and secondary level is still largely the responsibility of District and Provincial CMOs, depending on their financial situation. Formally the WUAs are also involved in the maintenance of the secondary infrastructure, but in practice they lack the equipment, professional capacity and financial resources to be involved in maintenance, let alone rehabilitation. At the tertiary level, WUAs and local authorities do occasionally engage in maintenance, e.g. through 'voluntary' collective work. Because of the bad state in which users received the infrastructure, these efforts are not sufficient and may lead to tensions.

The level of fee collection indicates how underfinanced the current system of water management is. Irrigation Service Fees are collected by WUAs to finance their tasks at the tertiary level and the CMO's activities at higher levels, but the rate of fee collection is a major problem. Although the amount is agreed by the General Assemblee, many of the farmers are not willing to pay. Virtually none of the WUAs are therefore really self-financing and many have debts with the government. Many of the WUAs do exist on paper, but are not really active in practice. The CMO is financed mainly by the water tariffs, which indicates the limits of that agency to attract qualified personnel and perform its tasks in O&M. In this situation, the CMO provides water in return for the monetary value of work done by the WUAs at the off-farm level. No effective sanction exists to enforce fee payment and water delivery is also unreliable (Sehring, 2005).

Kazbekov (2009) observes that there are four problems that currently threaten the functioning of WUAs: 1) The provision of water to many water users, 2) sustaining crop yields and productivity of water in subsistence farming, 3) ability of small farmers to pay ISF and 4) institutional sustainability of WUAs.

Due to a sheer lack of funds to maintain irrigation schemes, **Azerbaijan** has attempted to transfer the maintenance burden to some private organizations (548 of which between 2000 and 2002). WUAs were established as limited liability enterprises established in accordance with the Law on Limited Liability Enterprises, dated December 29, 1998. From a legal perspective they are not 'associations' under the control of an elected body accountable to members but enterprises free to undertake any kind of lawful commercial activity. WUAs were allowed to collect 25% of the amount required to be paid to AIOJSC for their own O&M costs (van den Boom, 2007). They used their income to pay a stipend to the Chairman and to pay a number of regular and seasonal staff to operate the system to the best of their ability. As for maintenance, with no machinery, transport for staff, and budget not much could be achieved.

The Irrigation Distribution System Management Improvement Project (IDSMIP, funded by the World Bank), signed in September 2003, undertook the rehabilitation of 56.000 ha (i.e. 45 project WUAs, eventually 22), restructuring 225 WUAs, that had taken over the management of irrigation and drainage infrastructure, establish proper operation and maintenance plans and water charge structure for 200 WUAs. To put WUAs under an elected board accountable to members, an amendment to the 1996 law was passed in 2004 and WUAs were re-registered as non-commercial rather than private sector organizations. WUAs would have a governing body and a separate management body, members would have access to the association's accounts, The on-farm area would be transferred to the WUAs after 20 years.

Box 8.1: IMT in Azerbaijan

"*The transfer of irrigation water management responsibility to users is a declared government policy and is part of the country's development strategy. The Water User Association law has been amended to provide the legal framework for their successful operation. However, NDP has shown that there are some institutional obstacles hindering the full implementation of the PIM policy and the WUA law. SAIC has still not yet transferred responsibility for part of the irrigation system to WUAs on long term lease arrangements as stipulated by the law. SAIC's explanation of the delay in transferring the system to WUAs is that it awaits a decision from the Government authorizing it, and SAAC is now in the process of requesting this decision from the Cabinet of Ministers as it pertains to the NDP. The transfer agreement between SAIC and WUAs should clearly state that the WUA is responsible for the operation and maintenance of the relevant part of the system and for charging the farmers for the service it provides on full cost recovery basis. At present, WUAs also claim that SAIC unofficially imposes limits on their ability to raise water fees to members to the level necessary for their attainment of full financial viability.*"

Source: Completion report of the NDP, Azerbaijan (2011)

In 2005 IFAD launched the North-East Development Project, NEDP (IFAD: 2005-2010), with similar objectives to be achieved over another set of six districts, rehabilitation going hand in hand with massive interventions in terms of training and institutional building.

What are the features of this IMT program, notably in rehabilitated areas? As for water management the agency (renamed AIOJSC) and WUAs enter into annual water supply contracts and agree upon a bulk allocation to the WUA. Planning of allocation is done by the Rayon (district) Irrigation Departments (local branches of AOIJSC), based on the type of crops and the number of sources of water available, with an order of magnitude of 3500 m3/ha (after losses in conveyance) (Rzayev, 2012). According to the rules fostered by the IDSMIP project, WUAs are to receive compensation (from SAIC) in case of damage caused by a failure to deliver water as per the contract. Yet, it is unclear what really happens in this particular case and it does not seem that this clause is operational.

Water scheduling and rotations (typically 4-6 days) are defined by the department based on the bulk amount allocated, the sources available, and crop requirements for the actual vegetative phase. Water management within the WUA (secondary) area (around 2000 ha) is under the responsibility of the associations which hire their own gate operators. Water records are based on gate measurements at several points but many of these are not reliable. But WUAs and Rayon Irrigation Department regularly check the amount of water provided at the dividing point to the WUA, where the WUA establishes its own control (Rzayev, 2012). The new land use structure (divided in very small plots), is not easily irrigated with infrastructures initially designed to supply large plots.

Maintenance at the WUA level is implemented jointly by Rayon irrigation Department (the owner of property) and the WUAs (the operator). Maintenance includes cleaning of the canals and drains and repair of hydraulic works for a better distribution and recording of data. Since the capacity of WUAs is poor due to low financial capacity, lack of technical know-how, experience and machinery, currently AIOJSC has taken most responsibility to support WUAs through rehabilitation projects for construction, trainings and maintenance of the irrigation systems. This is seen by the government (and project donors) as something temporary, with the hope that WUAs will gradually become financially autonomous (Rzayev, 2012; Vermillion, 2012).

The management of WUA is appointed based on a free election organized by the WUA members. The more experienced persons and those who are respected by the village society

and have the capacity to solve the conflicts that arise with water consumption tend to be selected (Rzayev, 2012). Membership in WUA is compulsory, and so is the payment of the fee, whose amount is nevertheless fixed by the association itself. Board members are elected every 5 years.

Agreements between the government and (rehabilitated) WUAs define water supply services and payments, O&M responsibilities and obligations, and financing and support arrangements. The fees collected by WUAs cover bulk water supplies (0.63 USD per 1,000 m3, that go to the agency), and WUA fixed costs (salaries and expenses) and system maintenance. On top of that –for the 22 WUAs that were considered for rehabilitation in IDSMIP - 10% of the rehabilitation costs (after 5 year grace) are to be added. The fee is decided by the WUA and there are large variations (depending in particular on maintenance needs and the crops grown) (World Bank, 2011a, 2011b).

Several WUAs have been formed in the 2000s in the **Jordan** Valley with the help of the GIZ. These WUAs were registered under the Cooperation Law No. 18/1997 and thus affiliated to the Jordan Cooperative Corporation JCC. Cooperatives, and have internal regulations that specify the objectives, capital, membership procedure and financial and administrative issues (GTZ, 2010). In early 2012, 23 WUAs have been established in the Jordan Valley, covering around 80% of the irrigated area in the valley, with 11 of them contractually tied to the JVA for joint management (Adwan, 2012). Each WUA correspond to a unit of 400-500 ha served by a pumping station that takes water from the main canal and supplies a pressurized pumped system. Prior to the transfer of responsibilities to WUAs rehabilitation of the system is necessary. This includes physical changes in the system (retrofitting pipes, changing meters, flushing pipes, improving the filtering process, detecting and repairing leaks, etc…) to ensure a better uniformity of pressure (in particular to higher level plots) (Salman et al., 2008).

The main canal is under dynamic regulation and fully under the control and the maintenance of the JVA.

WUAs (i.e. cooperatives) are now largely autonomous with regard to O&M within their command area. They collect a subscription fee of 3-5JD/month for each member of the cooperative that can be used for small running costs but are largely kept in a bank account to constitute shares for shareholders. The 11 WAUs under contract and the JVA sign annual agreements that specify the maintenance works, the salary of the President of the Association, of the ditch riders and even a (former JVA) water engineer (who can be 'shared' between several WUAs). This is said to result in a reduction of costs at the level of the JVA (but no specific data could be found). Ditch riders inspect the network, collect cropping patterns and individual meter readings monthly. The association registers violations, farmers' complaints and tries to solve them internally, or with JVA if need be. A qualified maintenance technician receives necessary materials from the Agency to carry out maintenance tasks according to a mechanism agreed upon between the Association and the JVA. Transparency is enhanced by the reporting of the WAUs to their members and there is also an annual audit and a report duty to the General Association of Cooperatives (Regner, 2012).

Membership is not obligatory and non-members receive the same benefits; the project strives to take membership over 80% during the first year of establishment (Regner, 2012). Elections are held every one to four years, depending on the assembly's decision. Farmers pay individually for the amount of water they use (a quota based on the type of crops, and evenly reduced in case of shortage), and the fee is recovered directly by the JVA (WUAs cannot legally do this). The water prices haven't been raised for almost 10 years. Although they are now pretty low the current economic and political situation in the region rules out any drastic changes in this situation. Water fees go directly to the Ministry of Finance's coffers and are not tied to performance nor reflect any type of commitment.

The schedule or the daily irrigation order of each pump is prepared jointly by the JVA and the WUA, according to crop water demand and keeping in mind the annual quota established by the JVA based on the available supply.

The wider context of this IMT reform and how a degree of trust has been restored both between farmers of a same unit and between farmers and the agency is noteworthy and will be examined in § 8.4.

8.2.2 Between cosmetic and effective PIM

Since the late 1980s, **Egypt** has experienced with a large number of projects devoted to institutional building. Because of the richness of this experience, a retrospective is presented in annexe. We analyze here the degree of transfer/empowerment that has occurred.

A first initiative geared towards setting up tertiary level WUAs is associated with the IIP (now IIMP) projects developed since 1988 up to these days (with support from USAID, World Bank and other donors). These projects replaced tertiary canals, from where farmers were abstracting water through individual pumps, by collective pumps that distribute water through raised canals or, under the current design, by low pressure buried pipes. The collective pumps make it necessary to establish an organization in charge of their operation and maintenance. 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, 2004). WUAs access water from a Branch canal in which, following IIP’s design, a continuous supply is to be ensured, instead of the traditional on/off rotation. WUAs in areas improved by IIP come under the 1994 bylaw that gives them a legal status, with in particular the capacity to collect fees as income and engage in contracting.

In 1996, efforts were geared towards the secondary (Branch canal) levels, where BCWAUs were expected to coordinate the actions of all tertiary canals, as well as liaise with the agency (local staff of the Ministry of Water resources and Irrigation). 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).

In parallel the Ministry of Water Resources and Irrigation “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 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 exiting 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.

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).

Relatively recent assessments of participatory water management (APP, 2007) has 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".

Another example of strong agency control is **Morocco,** where despite a participatory policy rhetoric developed in the 1990s (under the influence of USAID and the World Bank) and attempts to transfer some responsibilities to farmers' organizations, surface water management in large-scale irrigation schemes remains firmly in the hands of the state (Kuper et al., 2009). Initially, the irrigation agencies (ORMVA: Office Regional de Mise en Valeur Agricole) were not only responsible for water allocation and distribution but also determined cropping patterns, processed and marketed most industrial crops, including sugar, cereals, and cotton (Faysse et al., 2010). In addition, the State was strongly involved in the regulation of the market through prices setting and the implementation of development projects (Choukr-Allah, 2004). The situation varies depending on the ORMVA. Although there are officially 408 AUEAs in large-scale irrigation (Aloussi and Anbari, 2012), many exist only on paper, like in the Doukkala, Gharb and Loukkos schemes (Faysse et al.; 2010). The Tadla scheme has been the object of repeated efforts and donors' attention (Schaak, 1995; Freitas, 1996).

In the Tadla, a 100.000 ha gravity scheme, the ORMVAT is responsible for both operation and maintenance down to the tertiary level *included*. A provisional allocation based on available supply (in the dams) is established each year and farmers are informed about it. The gate keeper collects the requests from all individual farmers, prepares the rotation schedule for all of them (with starting and ending hours) and then establishes the duration of supply to the corresponding tertiary. The information is passed upward in order to prepare the overall distribution schedule. In return, on Thursdays farmers get a ticket with the details of the supply to their fields in the following week (there is a turn per week), as does the ditch rider (paid or nominated by the WUA), who distributes water within the tertiary. The system is somehow 'on demand' but request are capped by the seasonal quota defined by ORMVAT.

Farmers can decide whether to take water during a turn (for example some prefer to resort to groundwater) or to reduce the duration. As Plusquellec (2002) notes "*although the system has the capacity to be operated on prearranged demand and to provide the flexibility required to meet the farmers' needs, it is essentially a centralized system. This mode of operation was*

justified when rain-fed farmers were converted into irrigators a few decades ago. It does not respond to the needs of modern agriculture in Morocco".

During the year, the actual volume delivered to a farmer is calculated by multiplying the number of hours of his turn by the flow rate (generally 30 l/s) (Hellegers et al., 2007). The price of water is \$US 4 cents/m^3. Billing is done twice a year and the percentage of O&M fees collected is about 80 % (Van Vuren et al., 2004).

The role of the 36 WUAs has remained minimal for years. Recently the WUAs have gradually been involved in prioritizing maintenance work, the planning of water distribution, and canal cleaning at the secondary canal level. This has been made possible by a younger and more informed generation of farmers who have been invited by ORMVAT to participate in several decision-making processes (Faysse et al., 2010). The link between farmers and their WUAs leaders, however, remains very weak and general meetings are rarely organised.

In summary, there is no transfer of any task/responsibility to farmers. It must be noted that the incentives for farmers are quite low because O&M is quite satisfactory in the Tadla scheme and the problem of recurring scarcity lies beyond the scheme itself and its management. The financial contribution of farmers is substantial.

In **Tunisia**, large scale irrigation is limited to the lower Mejerda valley and to the Cap Bon. No information on WUAs in these two areas has been found (which raises questions on why so little documentation is available).

In **Algeria**, as mentioned earlier, the lack of experience of WUAs, water scarcity, the land tenure system and the complexity of large-scale irrigation systems are believed to have hindered the development of WUAs (Belkateb, 2012). The support provided since 2005 by ONID, the irrigation agency, resulted in a slight improvement in farmers' participation. Farmers are now participating in scheme monitoring committees and two of their representatives are invited to sit in their administrative boards. There is no clear evidence on what is the role of farmers in O&M and no clear policy seems to have been implemented in large schemes.

Similarly, in **Syria** centralized government agencies from the Ministry of Irrigation and the Ministry of Agriculture and Agrarian Reform take care of day-to-day water management in large-scale schemes along with their local directorates and the Farmers Unions. The Unions determine crop type and intensities on the basis of available water resources (Kaissi and Yasser, 2003).

In **Lebanon**, only the Canal 900 irrigation system managed by the Litani River Authority (LRA) has attempted to establish a WUA, through two successive aid/development projects. No agreement for co-management could be established between farmers and the Authority, and the WUA is not active. In other schemes managed by the LRA or Water Establishments (e.g. Qasmieh, Yammouneh), or by municipalities (Kfar debiane, Aanjar), no participation is observed (Karaa, 2012).Other WUAs have been created by specific development projects, such as the Hydro Agriculture Development Project of Marjeyoun (UNDP/CIHEAM – IAMB), which has also attempted to elaborate a draft law on WUAs.

Experience in a huge scheme such as the Gezira in **Sudan** with large number of smallholders under one administration has been reported as a case of successful PIM (Adam, 2003). Significant improvements in terms of crop productivity, maintenance, water delivery and fee collection rates were related to the given freedom to farmers to choose their crops, their full water management of the minor canals and also the government commitment through the Ministry of irrigation to keep the main irrigation system (upper system) in good shape and to supply the contracted amounts to the WUAs (Abdelhadi et al., 2004). These performance improvements were a result of '*concerted efforts from all parties to make the pilot project a success story*' and were not necessarily expected to be easily replicable in other Blocks without

the same concerted effort (Adam, 2003:18). What the impact of this pilot project is in the longer run, is therefore difficult to say, especially because no more recent studies over a longer period than 3 years are available. Since 2005 with a new Gezira Act, water user participation was generalized in the Gezira Scheme. More recently in 2010, the institutional set-up of water management in the system was changed again, with new entities entering the field of water management. Unfortunately, we do not know how this has affected the performance of the Abdel Hakam pilot project and other areas of the Gezira Scheme. Recent work on the Gezira Scheme shows a more complicated picture, were the responsibilities of O&M and fee collection are shared between the new Gezira Scheme Management Body, private security companies and WUAs.

8.3 The diversity (and importance) of financial flows

PIM/IMT worldwide has been strongly motivated by a desire by the state to shift part of the financial burden to water users. Cost recovery is chiefly targeted at the O&M costs and very seldom at recovering costs of investments, generally considered as sunk costs (see Molle and Berkoff, 2008, for more details). Faced with fiscal drought, agencies may either increase farmers' contribution and/or decrease their own costs. It is remarkable that policy emphasis on recovering costs from users often results in deflecting attention from the question on what these costs are, and whether they could be reduced in the first place.

But paying for water does not by itself ensure good maintenance and service. When the receipt from water charges is directly channelled to state coffers, there is no certainty that this money will come back earmarked for maintenance, and indeed the allocation of funds by the state for O&M is known to be quite independent from the receipt. Likewise farmers come to regard charges as a tax rather than as anything of direct benefit to themselves. This is even stronger when the water fee is incorporated in the land or other tax. Farmers then pressurize politicians to reduce - even abolish – the charges; or fight against their being updated or raised. This is the case in Morocco, where recovery is one of the highest in the region and worldwide. And in Egypt, where water is free, although farmers pay a land tax that may be considered as partly accounting for this service.

As Freeman and Lowdermilk (1991) rightly state: "*Farmers are quick to see that, from an individually rational standpoint, one is foolish to pay water assessments-especially those whose water supply and control are decidedly inferior- when water service is not substantially affected by making payment. To disconnect farmer payment of assessments for maintenance, whether in cash or kind, from water delivery is virtually to invite organisational decay*."

A second possibility is to have the receipt from water charges collected and directly used by the irrigation agency for its O&M activities. Often only one part of the receipt is kept locally and other parts go to upper levels of the water bureaucracy (like in Vietnam). In this case managers have an incentive to recover fees but the users still don't.

A third option is to have the money collected managed internally by the WUA for local repairs and maintenance, or to pay ditch riders, thus ensuring that user payments are used to maintain the infrastructure and improve operations in direct sight of the farmers concerned. The focus here is not on paying benefit taxes to the state but on ensuring both financial and physical sustainability of the tertiary (sometimes secondary) level through direct farmer involvement. In such a case the incentive for farmers to pay is much higher, since 1) they decide on what to do with the money, and 2) the outcome is of direct benefit to them.

A forth, hybrid, option is possible whereby the receipt is divided between the WUA and the agency. WUAs can directly keep a fraction of the receipt but it is more common to have the agency giving back a given percentage (as in Turkey and Azerbaijan?), to cover local O&M

costs (sometimes the transfer may also be conditional upon carrying out maintenance works or water savings first).

Cost recovery makes full sense when arrangements are centred on WUAs' financial autonomy, a clear definition of the responsibilities of managers and users, and inbuilt accountability mechanisms (Small et al., 1986, Small and Carruthers, 1991, ICID, 2004). Accountability mechanisms may include bulk allocation contracts, for example, but the virtuous circle of incentives is closed when managers depend financially on farmers' contributions. In such a case, the financial contribution from farmers is not just a transfer of costs to them but becomes an expression of their empowerment. Expectedly this situation is quite rare (Philippines, Columbia, Peru,..) and not observed in the NEN region. However, autonomy whereby WUAs fully decide how to spend funds on maintenance in their tertiary or secondary area, and hires/fires gate keepers to manage water locally, is already a substantial achievement. A farmer financial contribution to O&M is no doubt necessary if farmers are to be given significant managerial powers, but is neither necessary nor sufficient for effective overall management and maintenance. In some cases (e.g. Morocco, Tunisia) farmers cover most a substantial fraction of O&M costs and receive a reasonable service without strict accountability mechanisms.

While Small and Carruthers (1991) rightly recognized 'linkages existing between structural and managerial aspects on the one hand, with financial approaches on the other' (Small, 1990) they retained a functionalist view of agency-farmers arrangements: that charging linked to accountability could ensure transparent and effective cross-compliance and end the 'degradation vicious circle.' They have been criticized for overlooking the wider social and political dimensions that affect the level and utilization of charges independently of performance (Oorthuizen and Kloezen, 1995). Water charges are elements of negotiation in power struggles between farmers and their associations, and between WUAs and the agency or state. While these negotiations are bounded by hardnosed realities, such as farmer financial capacity and the actual cost of supplying water, they also reflect competing interests, differing perceptions, the political clout and bargaining power of the different parties, and the various levels of accountability and dependency between them. They are permeated by the distribution of power within and across these groups. In other words, while money creates some dependency, accountability is often shaped predominantly by inter-group and interpersonal relationships expressed in such factors as friendship, kinship, gifts, business partnerships, bribes, threats of violence, patronage, debts, asymmetries of power and information, and political allegiance. In Taiwan, for example, where the state pays for O&M, accountability is not supported by bureaucratic rules but is embedded in social relationships and social control. This warns us against simplified views of human organization and may help anticipate dysfunctions.

Another implication from this discussion is that empowerment of WUAs will be partly linked to the legal dispositions regarding fee collection and use. In Morocco a lack of political will to empower farmers (Faysse et al., 2010), is well illustrated by the authorities' indecision in allowing WUAs' financial independence (van Vuren et al., 2004): in the Tadla scheme WUAs were first established with budgets constituted by the 20% of collected fees handed back to them. However, this transfer was later cancelled because it was found to be in contradiction of the Code of Agricultural Investments (Doukkali, 2005).

In many countries where fees are conceived as a tax they can legally only be collected by the state and contribute to state revenue. WUAs are therefore not allowed to collect money by themselves and keep a part of the receipt. They have to levy additional WUA fees for their own current costs, should the law allow it.

Our review identified, yet other possible financial flows that all reflects different social and political arrangements. In Jordan, WUAs are so far registered as cooperatives and may collect their own fee as well as constitute their stocks of shares. They cannot collect water charges. But instead of having the charges used to cover part of O&M costs, WUAs *receive* money from the

JVA to hire ditch riders and engineers, and to cover some local maintenance costs. This is reported to be cheaper for the JVA than ensuring O&M beyond the collective pumping stations; and meant that JVA had to reduce its staff accordingly (Adwan, 2012). In **Egypt**, between 1995 and 2005, more than 40 Water Boards have been established in Fayoum by the Dutch-funded Water Board projects (APP, 2007). The Water Boards 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 WUO's (APP, 2007). These legal constraints can be obviated in the framework of pilot projects but are often not removed after the project end, as no legislation is issued to fully recognize the new types of organizations.

This discussion on whether, how and by whom can contributions from users be collected extends to how WUAs can, more generally, generate income. This has been discussed in § 6.7. It is not always very clear, even in official dispositions, what activities WUAs can undertake. As Faysse et al., (2010) note regarding the Tadla scheme in Morocco, "*although the 1990 WUA law does not impede WUAs from undertaking production-related activities, it is not yet clear which activities are acceptable for raising funds. WUAs were [also] prohibited from receiving a rebate from the irrigation authority in exchange for their activities. The limited enthusiasm farmers showed at the beginning completely vanished when they learnt that they had to fund the WUA on top of what they were already paying to the irrigation authority*".

Another dimension of financial flows is who determines how much users have to pay. It is generally the state agency (even for communal systems in Tunisia, where the CRDA determines the fee) but it is sometimes left to WUAs, like in Azerbaijan, where the fee reflects the maintenance needs of each area. While farmers generally react to high water prices (like in the Tadla, where demonstrations were staged two years ago against planned hikes), the agency sometimes cap the amount that WUAs can charge to avoid conflicts and possible abuses; this happened in Azerbaijan, at the cost of local-level maintenance and WUAs' autonomy.

8.4 The political economy context of IMT

Bureaucratic reforms that alter the relationship and the distribution of roles and power between the state and citizens are seldom implemented by an enlightened decision-maker suddenly convinced by the necessity of some change. They unfold in complex bureaucratic and political environments and are linked to wider societal changes. It is remarkable that PIM/IMT reforms focus on what farmers *should* be doing and pay so little attention to the other side of the 'transfer' equation: the state irrigation agencies. If some responsibilities have to be transferred, one should look not only at whether this is desirable for the state as a whole (reduction in costs) but also whether water bureaucracies have incentives to comply and support changes. We also discuss here how PIM/IMT reforms and their relative success/failure are related to their wider environment.

In **Morocco** the large-scale irrigation schemes developed between the 1950s and the 1980s, have long been under strong centralized management. In early days farmers had to comply with the land structure, the cropping patterns and the calendars determined by the nine ORMVAs, while prices were fixed by the government (Faysse et al., 2010; Pérennes, 1993). During the structural adjustment years of the 1980s and 1990s, the state withdrew from agricultural and marketing activities and raised water charges. The PIM policies put in place, much to the insistence of the World Bank, and "*as had been the case in the past, the government took the initiative, defined the rules of the game in its own way, and maintained the right of oversight of the associations operations*" (Belghiti, 2005). These policies did not yield significant changes in governance and most WUAs remained apathetic or non-existent. We have reviewed a number of reasons for this state of affairs (§8.2.2), not least the one-way burden that was to be placed

upon the WUAs. Van Vuren et al. (2005) identified a lack of political will for an effective transfer of irrigation management, illustrated by the failed intent to devolve part of the collect fees to farmers, and noted that "the staff from the ORMVAT does not want to lose its position as irrigation manager" (Van Vuren et al., 2004). Likewise, Bergh (2007) identifies a problem with the "*purely technical and depoliticized view of participation that dominates the attitudes of Moroccan civil servants… The deeper origin of such attitudes lie in the central government's reluctance to open up the spaces that are necessary for a more political sense of agency to develop. The latter would in turn allow participation to unfold as a truly transformative power for rural development*".

A similar situation is observed in **Egypt**, where a lack of motivation is perceptible at both the field-staff and manager levels. 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 WUAs. It is apparent that field staff has an inadequate sense of ownership and understanding of the improvements made by IIP (APP, 2007), are subject to frequent rotation and transfers, and have little incentives and even self-interest in the work they are supposed to perform.

Indeed the lack of field staff' personal involvement in WUAs 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 user organizations with a stronger negotiating-power. All this is extremely disruptive of the status quo and of the 'management-as-usual' strategy that minimizes management input.

There is also evidence that the ministry's officials 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. 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 who see irrigation management transfer (IMT) as including a 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*".

All these contextual institutional elements provide entry-point to an analysis that goes beyond emphasizing the infamous "lack of political will", commonly conjured up in critical evaluation of reforms. On this basis it is dubious that only mitigating the usually advanced causes of failure ("lack of 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).

We may continue zooming out and look at the wider political economy of agriculture and of the water sector. Reforms that alter decision-making power and/or the bureaucratic configuration of agencies are embedded within larger political or societal changes. The case of Jordan provides some illustration.

The achievements of the **Jordan** Valley Authority (JVA), since its establishment in 1977, have been mixed. Efficiency of irrigation has been increased due to a shift to pressurized delivery and micro-irrigation but later decreased due to maintenance costs and deterioration of the network, as well as degradation of both relationships between the JVA and farmers and collective action between farmers dependant of the same pumping station. Early rehabilitation efforts focused on the redesign and improvement of piped networks (TO2 project) but farmers rejected the transfer of the management to farmer's organizations (Mazareh et al., 2004). A GTZ-funded project started in 2001 attempted to redefine co-management by the JVA and WUAs in a context made difficult by resistance of farmers to this change due to previous negative experience with JVA, increasing transfers of fresh water to Amman and recurrent shortages in the valley, social heterogeneities (with large farmers favouring the status quo), dilapidated infrastructures and piped networks, and a lack of adequate legal frame for the farmers participation in the irrigation management (GTZ, 2010; Ababneh and Al Adwan, 2012).

The JVA was put under pressure in 2003, when rumours of privatization of the Authority were heard. At this stage a few promising interventions in four pumping stations provided a hope for a model, whereby farmers would take control of O&M beyond the point of the collective pumping station, leaving the JVA mainly with the operation and maintenance of the main canal. JVA was bedevilled with problems of corruption, over-staffing, and declining technical capacity (recruiting staff other than worker had been banned for ten years). With reduced budgets, vanishing political support, pressures from the cabinet to implement wider decentralization and privatisation, drought years which revealed poor water management, and complaints emanating from politically quite powerful tribes in the valley, JVA's room for manoeuvre was drastically reduced (Regner, 2012).

In 2008, the Ministry of Water incorporated the transfer of O&M to WUAs in the strategy of the Ministry and then into the National strategy, whereby WUAs would be made obligatory, with prerogatives to be defined by a new law that would give a legal basis to WUAs so that they could not be reversed by the administration.

As detailed above, WUAs now *receive* money from the JVA to hire ditch riders and engineers, and to cover some local maintenance costs. They are in charge of O&M within the service areas of the pumping stations and are becoming partners in the co-management of the scheme. The weakening of the JVA's political position, as well as the weakening of agriculture within the Jordanian economy altogether defined a background where some changes in agency/farmers relationships could more easily occur. Rehabilitation of pumping schemes and social facilitation

by the French and German cooperation respectively, complemented the stream of favourable conditions for a change.

Although reform often seems to be imposed from above or outside, in the case of Mexico Rap et al. (2004) argue that water reform was strongly linked with the engagement of the Mexican bureaucracy that was aware of insufficient funds for operation and maintenance under the financial crisis in Mexico. In the case of Turkey "there seems little doubt that dealing with runaway personnel costs and vanishing maintenance funding were primary motives driving DSI in its push to transfer O&M responsibilities to local control with such rapidity" (Kodal et al., 2005). Commitments and political will may also be the result of policy articulation rather than prerequisites for reform.

Zooming out further, we need to take into account "path-dependencies" (the importance of past history in determining evolutions) and the historical contexts of PIM/IMT reforms. While early programmes were focused on achieving a number of local objectives, for which WUAs were a necessary element, water policies took a much more reformist turn during the structural adjustments of the early 1990s, when 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 was unambiguously linked to a will to reduce state expenditures and shift part of the O&M burden onto farmers. It was also expected that decentralisation, transfer, and the privatization of some tasks (e.g. some maintenance work being handled and paid for by BCWUAs in Egypt, but more generally allowing the private sector to take managerial and financial control over operation and maintenance) would result in more efficient outcomes in terms of water control. This was a clear driver of the Turkish IMT programme. In Egypt the former Minister of Irrigation, as mentioned in the introduction, stated that "irrigation operation and maintenance always require big efforts and form a large financial burden to the government… [and spoke of the] great desire to transfer the irrigation management responsibility to farmer's organizations".

In Central Asia and the Caucasus, too, irrigation reforms were both triggered and shaped by the peculiarity of the recent political history. In general, this region faced the decline of the Soviet Union and the subsequent geopolitical and resource struggles between major power blocks and individual countries along the borders of the former Soviet empire. Further, after independence these countries experienced the disintegration of a complete system of centralized planning of irrigated agriculture and the reorientation towards a market-oriented economy. Irrigation reforms thus became triggered by and followed the land reform policies that broke up former state and collective farms. Different countries followed other trajectories dependent on this regional history and the rate and pace of land and water reforms.

8.5 Policy models and their formation

Last, we can zoom out one more time to consider the global context in which concepts like PIM or IMT are designed, as well as the interests and practices of donors with regard to the way development and cooperation projects are implemented. At the confluence of participatory rhetoric and the politics of 'rolling back the state', institutional reforms carried out under the banner of PIM or IMT have acquired the status of a panacea (Meinzen-Dick, 2007) and have become standard policy recommendations. The Mexican model, in particular, has fulfilled the role of a 'policy model' in the dissemination of institutional 'best practices' (Molle, 2008).

It is not rare to see donors, or their consultants, having to pursue the reforms they have promoted or designed even though they are aware that the conditions for the sustainability of WUAs are not met. In no known case has the proper mobilization of funds for O&M been ensured after the project, and the likelihood of having enduring and effective WUAs is extremely

low. In Azerbaijan, the sustainability of WUAs in non-rehabilitated was a matter of concern. The World Bank (2011a) recognized that they "will also only become strong and sustainable if the economic productivity of agriculture increases through changes in crops, better cultivation practices, value-added crop processing and access to good markets. This will require a significant role for the Ministry of Agriculture. Without improvements in the value and stability of irrigated agriculture and more open, democratic decision-making, WUAs will be weak". Wishful thinking allowing, the outcome is left to be dependent on hypothetic (and unlikely) developments. If farmers are unlikely to pay for O&M at the levels required, the government might step in. But here, too, "It is still not clear to what extent the Government will adequately fund O&M at the main scheme level", notably drainage.

In other situations, donors –and their consultants- spend remarkable energy in trying to generate enthusiasm for their reforms. In Egypt PIM/IMT policies were strongly supported by USAID, for whom 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, trainings and lobbying efforts helped to provide the "bureaucratic orientation" required (Aziz, 1995).

Since development bank and aid experts have ben 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: In Egypt "*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.[8] 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 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. 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).

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[8] 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).

The diversity of WUAs points to the inappropriateness of the universal blue-print models often observed (e.g. Mollinga and Bolding, 2004) and policy documents sometimes explicitly state that models need to be adapted to the context and needs of people. Nevertheless, the standardization of organizational models is ongoing among donors and governments. So, what drives this process of standardization and formalization of WUAs?

First, as water professionals and researchers we also participate in this process of standardization by labelling a large variety of organizational forms as WUAs that are similar in shape and appearance, but different in practice, content and context.

Second, institutional theory explains the role that coercive, normative and mimetic isomorphic pressures play in the adoption and spreading of organizational standards (DiMaggio and Powell, 1983; Brunsson et al, 2012). Coercive pressures often originate from international bodies or the state, as we have seen throughout this study. Normative or expert pressures occur in a context of professions that share a common knowledge base and disciplinary background and have a dominant influence on policy making, in this case for example engineers. Mimetic pressures mean that organizations often model themselves on other organizations, not necessarily to improve performance, but to achieve external legitimacy.

Third, standardization is part of a bureaucratic process of policy making that includes the creation and diffusion of organizational models, enhanced by well-supported and privileged pilot projects, promotional campaigns and their further up-scaling (Rap, 2006). Further, the acceleration of the IMT policy process like in Turkey or Kyrgyzstan imposes a degree of routinization, homogenization and replicability. Finally, the way in which the national bureaucracy and international development institutions constructs rural society in terms of organization imperatives facilitates standardization (Mosse, 1999)?

This section draws our attention to the fact that policy reform outcomes should not merely be seen as some kind of social engineering, where a set of given measures -if properly implemented by the state - should mechanically lead to successful outcomes. Reforms are embedded within broader political transformations at the national and global levels.

9 Conclusions

9.1 General conclusions

This report has investigated the role and importance of Water User Associations (WUAs) in the NEN region. WUAs distinguish themselves from traditional communal - largely autonomous- collective action around the management of relatively limited sources of water, such as springs, qanats, wells, or small river diversions. They are basically creatures of the state: it is useful to distinguish between a first situation, where WUAs are set up to be the counterpart of donor- of state-initiated projects, and are expected to ensure their physical and financial sustainability, and a second situation where WUAs are meant to co-manage large public irrigation schemes with public agencies. In both cases however, institutional building is shrouded in a participatory rhetoric and largely thought of, and implemented by, state or development agencies.

Participatory irrigation management (PIM) and irrigation management transfer (IMT) have been prominent in many policy packages of national water sectors worldwide. Although in line with the emergence of participation as a central theme of natural resources management, PIM/IMT policies are unambiguously linked to the 'rollback the state' ideologies of the late 80s and 90s. They correspond to structural adjustments, massive deficits of government budgets, donors' frustration in the face of the recurring degradation of irrigation infrastructure, and a depreciation of the role of the state as the central actor of economic development. As a result, state-initiated PIM/IMT policies often heavily emphasize the financial autonomy of Water User Associations in charge of, or benefiting from, some water infrastructure, be it independent or part of a larger public state-managed scheme. Financial autonomy means that WUAs are chiefly expected to ensure both cash and in-kind contributions to the operation and management of these hydraulic networks, thus lowering state expenditures.

Institutional building, however, is too often mistakenly conceived of as a sort of social engineering. Functionalist approaches look for the right mix of internal rules, enabling environments, and management tools that are supposed or expected to be conducive to active and sustainable water user groups. This is fully in line with conventional approaches to water governance and mirrors the fundamental 'pillars' on which good governance is supposed to rest (GWP).

Social dynamics in general, and collective action in particular, are however not easily elicited or shaped by voluntary approaches, often implemented in the framework of a time-bond and budget-limited development project. Human groups are not homogenous and rarely found to be self-organizing just because one believes "it is in their interest" to do so. In large-scale public schemes managed by irrigation agencies, water users at any scale are dependent upon water fluxes and management decisions taken at upper levels. This practical interdependence is also shaped by the power dynamics which permeate the allocation of scarce resources and by the wider cultural relationships between the state and the citizenry. These general introductory statements are needed to understand the context in which the following detailed conclusions are to be considered.

Overall few WUAs in the region can be said to be active and performing as planned. Participation has been in most cases limited, if not cosmetic, and the physical and financial sustainability of both hydraulic infrastructures and Associations are not forthcoming, especially in large scale public schemes. Determining whether WUAs in the NEN region are effective or not, and how they could be made more efficient and sustainable, gradually appeared to us as an inadequate overarching question. Our review has led us to formulating the following comments and conclusions:

- *Available literature*. Most of the literature on PIM/IMT experiences originates from individuals belonging to ministries, companies, or aid agencies that are linked to these projects and merely publicize their results in a summary and uncritical manner. The advantage is that these professionals have first hand information, yet this also creates powerful incentives to report and produce evidence on the success of policy and may generate less attention for those aspects of policy that work differently than the model predicts. Assessments usually concern on-going or just completed projects and changes are frequently reported in a partial and/or vague way. *There is a sheer lack of independent, comprehensive, long-term assessments*, which makes it very difficult to discuss the sustainability of any arrangement or reform.
- *Review of effectiveness*. Reviewing the performance of WUAs in their three main responsibility domains (water management, maintenance, financial management) was disappointing. One of the reasons is the high diversity of situations and reporting. There is a mixture of data that relates to ongoing projects, projects that have just been completed, as well as more general country level analyses. Most of the literature available is very sketchy in its description of how operation and maintenance are conducted in practice. Measuring improvement or changes in the quality of water management and maintenance is not easy; few -if any- studies provide well-documented evidence of changes and causal links.
- *Limitations to quantitative assessments*. As a result our initial attempts to quantify the magnitude of changes associated with the establishment of WUAs or wider policy reforms appeared to be vain. Even aggregated or qualitative indicators of changes were found to be illusory. The analysis was therefore redirected to illustrating the diversity of cases, discussing implementation and policy processes, and reflecting on wider institutional and political practices.
- *Emphasize qualitative nature of social processes*. PIM/IMT is by nature a social process and the quality of this process –changes in behaviors, social interactions, sense of responsibility, accountability mechanisms, etc- is very hard to capture on a quantitative scale.
- *Internal and external (un)favourable conditions*. An IFAD study in 2001 (Bishay et al., 2001) found that the technical, productivity and financial impact of WUAs are likely to be enhanced when: (i) WUAs are appropriately established, trained and operate efficiently and equitably, (ii) WUAs are given opportunity to participate in planning of the tertiary system, (iii) WUA members have access to other needed production inputs and infrastructure, (iv) There is irrigation agency or other government (e.g. MOA) or NGO support for WUAs, and (v) The external policy environment is supportive of WUA operation. Vermillion (1995), based on a study of IMT programmes in five countries, identified five conditions for successful IMT efforts: strong high-level political support with clear policy direction, legal basis for new managing entities, economic benefits for farmers, well defined water rights at system and farmer levels, functional irrigation. Other studies (Garces-Restrepo et al, 2007; Aditi et al., 2010, etc) have identified the same and other factors.

  Generally speaking, context-specific factors positively correlated with effectiveness include the small size of systems, positive incentives to both farmers and WUAs staff, leadership and strong social capital, administrative, managerial and accounting skills, the provision of a diversity of services, democratic choice of board members, the definition of clear policies and responsibilities for each party involved in water management, adequate staffing levels and physical infrastructure, a legal framework, low interference from politicians or other groups, high-level political commitment,

marketing facilities, predictable water supply and irrigation scheduling, sufficient revenue (state budget and user participation) to support proper O&M and prevent the degradation of irrigation and drainage infrastructures, etc. Conversely, WUAs are negatively affected by the lack of such factors and conditions.

- *Are legal frameworks key*? While these many factors are well identified, it is however apparent that none of them is either necessary or sufficient. A good example is provided by the oft-stated necessity to have a clear legal framework defining the attributions of WUAs. The diversity of cases in the region illustrated that the correlation was not so obvious: countries without proper legislation, but which have made use of other institutional and legal configurations (eg Turkey and Jordan), fared better than others where specific pieces of legislation have been passed (eg Morocco, where WUAs attributions amount to a long list of duties).

- *Elections and democracy*. Likewise, the election of WUA boards by democratic election is seen as key to ensuring legitimacy and transparency. However the democratic nature of elections is often affected by the high rate of illiteracy of farmers (e.g. 70% in the Tadla case, Morocco), and the capture of the organization by local elites or powerful people. In some cases the WUAs are controlled by the ruling party, while board members may use their new position and power as springboards to political positions. In such organizations, elections may take place only to conform to the requested formal procedure. They are perhaps often a necessary step, but clearly not sufficient to ensure proper management of the WUAs and their representativeness.

- *Illusive Leadership*. Charismatic or strong leadership, once again appears to be a paramount factor in explaining local social dynamics and successful collective action. This is of little help to social engineering approaches, because such occurrence largely lies beyond external interventions and remains as a fact of life rather than something which can be duplicated or even enhanced.

- *The predictability of water supply*. Like in many other places, water efficiency at both the plot and system level is heavily determined by the quality in supply ensured by scheme managers.

  PIM/IMT are heavily focused on the new roles that farmers or water users should be fulfilling. Much of the blame for water overuse or degradation of infrastructure is placed on farmers. This conveniently detracts attention from the responsibility of the irrigation agency itself. Of concern are not only whether the actual O&M costs that are expected to be partly shouldered by farmers are acceptable (in other words why would farmers accept to pay for overstaffed and costly administrations) but also whether the way water is distributed to the different user groups is predictable enough to enable them to manage water at the lower levels.

  Improvement in the predictability of water supply is probably the most important expectation by farmers (e.g. Nubaria's New Land in Egypt). It is noteworthy that instances where management transfers have resulted in commitments from the agency, and therefore in creating a degree of accountability, are very rare in the region. Even transfer agreements in Turkey do not mention the bulk amount of water that a given WUA is supposed to receive. Agreements are more specific in Kyrgyzstan and Azerbaijan, but we didn't find evidence that something happens when planned bulk allocation is not respected. Only Jordan and Morocco ensure volumetric service, but the volumes allocated are defined by quotas that are much below farmer requirements.

- *Financial management*. While financial management, and its transparency to members, is rightly seen as key to the good functioning of WUAs, hardly any report/article dwells on how WUAs effectively manage their finance; whether wrongdoing is frequent or not.

- *What should a WUA have/be*? The search for a definite number of parameters and conditions that should be ensured in order to produce effective words is illusory, for two reasons. The first reason is factual: as there are very few, if any, both performing and enduring WUAs in large-scale public irrigation schemes, it is virtually impossible to identify conditions or contexts, conducing to successful comanagement. This applies to the NEN region but is probably true worldwide (even if some statistical analysis may prove to be worth, when the cases considered are restricted to a more homogenous sample, like farmer managed irrigation schemes in Nepal, or Taiwan, to take a few examples of earlier studies).
- *Consider social 'thickness'*. The second reason is more fundamental. It enounces the limits of a functionalist approach where institutional building is akin to social engineering, and success merely the result of the optimal adjustment of institutional nuts and bolts. There is little room here for competing interests, differing perceptions, the political clout and bargaining power of the different parties, and the various levels of accountability and dependency between them. They are permeated by the distribution of power within and across these groups. WUAs are not homogeneous and inter-group and interpersonal relationships are expressed in such factors as friendship, kinship, gifts, business partnerships, bribes, threats of violence, patronage, debts, asymmetries of power and information, and political allegiance.
- *Determining water fees*. Regardless of what is felt by consultants and economists to be the right cost of water to be paid by farmers, it is apparent that actual prices reflect more pragmatic realities (farmers' ability to pay; the state's legitimacy to impose payments; as gauged by the quality of the water supply service it is able to ensure; the political clout and bargaining powers of the different parties; the political risk to increase prices; etc).
- *Cost recovery and its hurdles*. Irrespective of the price of water charged to users and of the way it is recovered in practice, it is abundantly clear that water fees are always insufficient to cover operation and maintenance costs, even if there were fully recovered, which is never the case. This is true for both farmer managed schemes and public irrigation systems, and only one WUA (GDA) in Tunisia was found to be capable of fully covering both current and emergency needs.
- *Can farmers pay for O&M?* An implicit conclusion is that IMT policies focused on shifting costs to farmers group might just be unrealistic in most settings. In several cases it was clear that objectives of reducing the role and expenditures of the state translated into wishful thinking, and into the failure of projects as soon as direct support ended. While in many cases farmers are capable of taking over costs and management roles at the tertiary level, it is clear that it is not the case at the secondary level. At this level financial autonomy is probably only possible within the framework of a sweeping reform that would not only transfer costs but also empower farmers and assure a degree of accountability of the irrigation agency. No such transfer can be found in the NEN region.
- *Second generation problems?* The main problems facing WUAs after PIM/IMT have been dubbed 'second generation problems' (see Svendsen et al., 1997; Hamdy, 2004) and include insecurity of water supply, lack of support from irrigation agencies, economic and physical un-sustainability of irrigation systems, especially related to insufficient financial autonomy, insufficient financial and administrative management skills of both agencies and WUA staffs. With hindsight, this can rather be read as a failure to implement institutional changes, further to early statements of success based on superficial indicators (number of WUAs established and trainings carried out, initial increase in water fee collection, apparent adherence of agency staff, etc).

- *Build on existing organizations*. Standard WUAs are often created in contexts where other organizational forms are already in place and could be made use of. For example, in the new lands of Egypt, cooperatives are already significantly involved in both operation and maintenance, and have effective mechanisms to enforce payment of expenditures by farmers. Adjusting or expanding their mandate might be a much smarter way forward than creating additional artificial organizations that have no legitimacy and power.

- *WUA's horizontal expansion (economic diversification)*. At present it is difficult for most WUAs to generate sufficient income to cover the ordinary expenditures related to O&M, let alone rehabilitation. One solution can be to raise irrigation tariffs to the level of financial sufficiency, but this is financially and politically extremely difficult and unlikely. Another solution consists in diversifying WUAs' activities (horizontal expansion), including fertilizer, pesticide and seed supply, sale and repair of on-farm irrigation equipments, animal husbandry services, transport facilities (e.g. refrigerated vehicles), crop processing and storage, marketing, contract farming, loans, incentives, sale of water to other users, renting-out land or equipment, etc. However functional diversification generates its own risks and requires considerable professional and managerial knowledge, but also strong social capital among the members of the WUAs, and transparency in financial management, with rules and legal frameworks to regulate services and help prevent financial abuse.

  Although evidence from the region is limited, we tend to endorse Garces-Restrepo et al.'s (2007) statement that "*The possibility for WUAs to make profits and engage in agribusiness should be explored. Most governments resist this and do not allow WUAs to engage in activities other than irrigation system management. However where permitted, WUAs have often developed cooperative purchases of inputs, agribusiness activities and group marketing that have proved viable particularly in Asia. These activities build on the social capital created by the WUAs and can build stronger loyalty to the WUA if managed properly*".

- *Financial flows*. Financial flows (who pays how much and for what) in public schemes are critical to ensuring both sustainability and accountability between parties. In most cases, however, water fees go to state coffers, without direct link and much impact on the local operation and maintenance. In some countries like Turkey and Azerbaijan WUAs keep and manage part of the receipt to pay for local costs, including hiring their own staff (this is now also the case in the Jordan Valley). Agency's staff is never directly paid by water fees, which precludes any kind of accountability through users' payment.

- *Imposed collective action?* The local maintenance that can be done through farmers' collective action (typically cutting grass and cleaning small canals) is hard to elicit through an external intervention if farmers have not been able to organize in the past; especially if the organizational form is imposed from the top and comes together with an increase in duties and costs to farmers.

- *Assessment of costs and benefits to users*. It is apparent that most reforms are launched based on unrealistic assessments of the costs (underestimated) and of the benefits (overestimated). When the former end up offsetting the latter then the whole process of collective action is undermined and quickly annihilated. Governments, on their side, tend to focus on their perception of the benefits (reduction of state expenditures). This explains why the 'expected outcomes' do not materialize to the extent that would make the associated concrete benefits large enough to instil adherence of members to the reform.

- *Assessment of costs and benefits to managers.* PIM/IMT policies also display a lack of concern for the incentives faced by managers and officials in concerned agencies. By definition PIM/IMT policies are meant to reduce agencies attribution, and more often than not budget and staff, and yet this staff is also precisely the expected agent of change. Capacity building and awareness raising are obviously not sufficient to elicit adherence to reforms. Frequent failure to pass laws empowering WUAs (or processes than take one or two decades and lead to watered down legislation) can also be ascribed to the disincentives to line agencies and ministries.

- *Reforms and societal changes*. Reforms that alter decision-making power and/or the bureaucratic configuration of agencies are embedded within larger political or societal changes that have a strong bearing on effectiveness. The case of Jordan provides an illustration of change whereby the agricultural sector has partly lost its importance and where the irrigation agency (JVA) has come under both political and financial pressure.

- *Community management vs. public management*. It is paramount to distinguish between community-managed (small) systems and large public schemes. In the first case, WUAs are supposed to be as autonomous as possible (at least in financial terms) and generally have greater latitude to design them management rules. Since many of these systems are akin to common pool resources systems, they also have substantial and ancient social capital; although this capital is frequently challenged by growing heterogeneity in communities (migrants coming in, economic diversification which may decrees the interest of some farmers in agriculture, etc) or by changes in the resource itself (springs or qanats undermined by wells, river diversion affected by upstream development, etc). In the case of public schemes, collective action is often more strictly defined through the establishments of WUAs which generally face higher costs than benefits, and are more tightly controlled by state agencies.

- *State interventions in farmer-managed schemes*. While theses external interventions have succeed to meet 'some' technical objectives, they have often weakened traditional management. This may happen through the disappearing of collective labour for seasonal repairs (for example of weirs or qanats) and the social links that it both help creates and result from, or through the induced perception that major works or rehabilitation are eventually the responsibility of the state. It also happens that a new project brings additional benefits (e.g. the possibility to expand the irrigation area) which may be captured by local elites, thus reinforcing inequities. In other cases, however, it was observed that WUA formation was taken advantage of by younger generations eager to challenge the *status quo* of older elites. In yet other cases, WUAs are seen as convenient channels for political influence, and are either controlled by the ruling party or opportunistically used by some individual with political ambitions.

  In other words, there is insufficient attention to the fact that external interventions, however technical they may appear, often have a bearing on the distribution of power and benefits within the community. As such, they trigger individual strategies and social dynamics that are often quite different from the desired collective action expected from formal WUAs for the sake of the common good.

- *Pervasive state control*. In most countries, the state by means of its water, agricultural, environmental bureaucracy retains a tight control over WUAs. As we have seen in this report, this happens for example by controlling the election of board members, the legal status of WUAs, the rights and responsibilities stated in legal documents, the direction of revenue flows, or their societal and political role. The governmental bureaucracy thus effectively plays a determining role in making and implementing PIM/IMT policies. It

shapes WUAs in ways that are instrumental to its interests. Any idea to change the relationship between state, society and market in water management, therefore also requires a perspective on bureaucratic reform.

- *Imposed models and legitimacy*. The degree in which WUAs were externally imposed to materialize the (financial) needs or cover for the limitations and costs of international and national organizations does not contribute to their internal legitimacy and authority among water users. On the contrary, in some cases the formalization WUAs has destroyed or weakened the authority of existing customary organizations. Admittedly, in a limited number of cases, especially through horizontal integration, the WUA has enabled existing community institutions to link in new and productive ways to the government and the market.
- *Contextualizing policy changes*. In order to move beyond the single-minded focus on the success of IMT and PIM policies and the performance of WUAs, this study has tried to re-contextualize these policies in time and space as part of a set of wider policy and transformation processes occurring across various scales:
  - following the end of the Cold War and furthering the advance of global capitalism
  - following a long process of centralization of water management in the state
  - part of neo-liberal transformations aimed at rolling back the state, such as privatization, liberalization & decentralization
  - structural reforms of state-led and central planning systems into a market-based economy
  - policies adopted by governments in the context of financial crisis, dependent on international capital, made conditional upon structural adjustment
  - in the former Soviet Union closely associated with agrarian and land reform policies and the disintegration of state and collective farms
  - promoted by a policy coalition of international financial institutions, development and research institutions and transnational policy elites
  - influenced by geopolitical (and resource capture) shifts between the US, Russia and more recently China and other regional powers (e.g. Turkey)
  - embedded in bureaucratic reform processes and internal struggles between different bureaucracies

  Understanding this context clarifies the overall focus on the reduction of public expenditure and the improvement of fee recovery. Nevertheless, it is still remarkable to recollect what an ideological fervour was invested in WUAs, PIM and IMT as the solution to many rural problems at the time. Irrigation reforms in different parts of the world converged to a large extent and the WUA became a dominant organizational model, because policy makers ascribed many ideal features to a WUA that neither the state nor the market possesses. Retrospectively, it is not entirely surprising that these policies and organizations fail to meet these high expectations.
- *"WUA" obscures diversity.* We subscribe to the statement that "WUAs encompass a variety of organizations, which assume different names but their basic structure conforms to a singular somewhat idealised model of organised user management... Imposing blue-print, one size fits all institutional models will not fix the complex and diverse management problems of irrigation systems" (IWMI, 2011).

9.2 IFAD projects and WUAs in the region

The study's comprehensive literature review on water management and WUAs in the NEN region included all relevant documents on 12 IFAD projects in seven countries of the region that

included a component on setting up or strengthening WUAs (see Appendix 2 for more details on the projects). Most IFAD project documents were found to be very general in nature, which led us to limiting our analysis to qualitative insights. Since the project documents contain little information on the inner workings of WUAs, it has not been possible to carry out an in-depth assessment of IFAD's approach to setting up WUAs, nor on the determinants of their degree of success/failure. But some commonalities associated with wider policy tendencies regarding WUAs are presented below.

International donors and development banks played a major role in promoting IMT/PIM policies, together with international organizations, such as FAO, IFAD, IFPRI and IWMI, which played a supportive role in the formalization of WUAs. These banks and donors had an interest in the physical and financial sustainability of their investments and often made the formation of formal WUAs a pre-condition to their loans or grants. In the NEN region and elsewhere these policy processes were thus more externally than internally driven.

Most of the reviewed IFAD projects also included formation and/or strengthening of WUAs - although not explicitly as a precondition- as part of the creation, rehabilitation or modernization of small-scale to medium scale rural infrastructure for improved agricultural land and water management. Project documents, especially those related to Egypt (WNRDP), Tunisia (PDARI Siliana and PDARI Zaghouan), Morocco (Province d'Al-haouz and Taourit-Taforalt), Azerbaïdjan (NEDP), Sudan (GSLRP), Yemen (DPRDP), and Jordan (YARDP), indicate that IFAD development projects are highly composite/integrated and address several aspects of rural livelihoods including agricultural development, rural development, conservation of soils and water resources, gender, animal husbandry, financial services, coordination and management, roads, health, drinking water, education, etc. Only a few projects had a specific component on irrigation (Azerbaijan, Morocco, Sudan, Yemen) (see appendix), and only the North-East Development Project of Azerbaijan had as its primary goal to "support WUAs to operate and gradually rehabilitate on-farm irrigation and drainage systems on behalf of their members in ways that are financially viable, equitable and sustainable".

The reporting takes a quantitative and descriptive approach towards the technical as well as the institutional achievements, focussing on size, surface and number. This reflects an approach focused on the faithful ticking of boxes according to the ideal that WUAs should exist, but does not encourage a clear view of where this is heading. Unfortunately, the number of created or strengthened WUAs, the amount of surface area managed by WUAs, the number of users served, meetings held or board and staff members trained are not reliable indicators for the institutional sustainability of WUAs.

From our review of IFAD projects, we identified factors which can contribute to the sustainability of WUAs are:

- existing communal organizations appropriate WUAs
- informal and formal organization
- strong leadership
- diversification of revenue sources and horizontal integration

However, what deteriorates the sustainability of WUAs, are:

- weakening of customary and collective rules & rights
- political aspect of water management
- limited and late involvement of water users
- lack of accountability of the WUA Board
- lack of marketing and credit facilities
- low cost recovery for WUAs
- WUA formation and fee collection externally driven

These results confirm the insights of IFAD's 2001 study (Bishay et al., 2001) on the factors contributing to the establishment of effective and sustainable WUAs (24 IFAD projects in 22 countries), as well as other studies with similar approaches.

These factors are not only contextual but are also related to how the process of technical intervention and involvement of water users was undertaken. This prompts the need to rethink the social engineering approach with which IFAD plans and implements its project interventions and combines technical and institutional dimensions of water management. Why does IFAD help to establish WUAs? are the expectations behind their establishment realistic? Are WUAs the solution to the problems faced by IFAD in achieving needed and sustainable infrastructural interventions? Instead of creating new standard associations, is there any existing organizational structure which could be used and expanded to fit the project's objectives?

Financial viability may be considered as a core problem of the organizational performance of WUAs. Initial expectations are optimistic, because pilot projects show that it is possible to reach high degrees of cost recovery with the support of aid/development projects. However when these experiences are scaled up to less privileged conditions, cost recovery levels drop significantly and many formal WUAs stop to function. Since the level of water fees in farmer managed small schemes is generally defined by the users themselves, it is unreasonable to expect that associations, under the economic and socio-political conditions observed in most projects, will be able in most cases to collect more than running costs; this leaves emergency and depreciation costs unattended and indicates that state intervention will often be inevitable in the future.

IFAD and other donors, however, find themselves constrained by the legal framework of each country, as well as by the limited degree of autonomy of civil society organization generally that is allowed by the states. Although the diversification of activities of WUAs holds the promise to increase both the financial capacity of the Association, and the stream of benefits to users, in many cases this is not allowed by state legislation.

The technical and construction components of projects (lining, replacement of earthen canals with PVC pipes or concrete canals, digging wells, construction of permanent diversion weirs, etc.) usually receive the bulk of the project funds. Since fewer efforts are devoted to "soft components", since it is predictable that in many cases the WUAs are unlikely to be sustainable in the mid-to long-term, and since project evaluations are quite superficial, one may question whether WUAs are just token organizations needed to 1) package the project in participatory rhetoric, 2) make the investment possible. The weakness and superficiality of the monitoring and assessments of PIM/IMT project components and policies, prompt the question, that applies to all projects in general and IFAD's in particular, as to whether anybody really wants to know.

Bergh (2007) (evaluation of IFAD's project in the Mountain Zones of Al Haouz Province in Morocco) and Pant (2008) showed that lack of openness in the preparation of development plans and planning phases, as well as project implementation, was the main impediment in the successful execution of IMT/PIM programmes. Indeed, these programmes were apparently not widely discussed nor shared with farmers' representatives, farmers' points of view were not incorporated, and works were usually undertaken without any involvement of local representatives. Thus, technical design was not conducted in a way that it is effectively responsive to farmers' concerns and knowledge of the terrain.

Another common observation is that the efforts devoted to supporting WUAs are in most cases minimal, at least when seen in terms of budget and compared with infrastructural components. An additional limitation of time-bound projects (even though some IFAD projects lasted between 5 to 10 years), where institutional activities are often delayed due to the fact that government

counterparts are not trained or ready to implement them at the beginning of the project, is that social dynamics and learning can rarely be made to fit with the project schedule.

In spite of these findings, and widespread adoption of the rhetoric of PIM/IMT, not much has changed in the social engineering approach applied in the recent past. The way that WUAs were addressed is instrumentally filling in an institutional gap according to a particular model of a WUA. However, this does not create sustainable organizations able to challenge the problems that they are facing, such as bad infrastructure, lack of technical equipment, underpaid staff, no incentives for good work, difficulties in collecting fees, etc.

In summary, IFAD could consider the following options:

- Questions whether and when formal WUAs established for the projects' purposes are the most appropriate institutional solution to secure the physical and financial sustainability of its interventions; existing organizations (such as cooperatives) might be better suited (eg Nubaria project), especially when they allow for horizontal expansion of activities.
- Rethink approaches to plan, monitor, implement and evaluate project interventions and combine social, technical and institutional dimensions of land & water management, bearing in mind the ultimate purposes of this endeavor; "soft" components should probably receive more attention (and budget) than is the case at present. They could also be given specific attention at the time of project appraisal (when overoptimistic assumptions are made about collective action or agency's institutional and political support).
- Make sure local populations are involved in the design and preparation, even if this has to lengthen the preparatory phase of the project; this may sound like a standard recommendation, but whatever the participatory rhetoric is, this is still found to be insufficient and to negatively impact project's outcome.
- Support to WUAs after realization of works is often limited. IFAD could diversify its counterparts and involve NGOs to be in charge of institutional support. This could even continue at a modest cost after completion of the project.
- Capacity-building is too often limited to the board members of the association, while other members are only considered in 'awareness raising' activities. This often proves insufficient to generate adhesion to collective action and WUAs' objectives. Widening capacity-building activities is certainly helpful.
- Reconsider reporting requirements for ongoing projects with the aim to include the social and technical as well as institutional process of intervention; it must be recognized that this is very hard to achieve through the standard short-term evaluations that are currently carried out. Consequently, a few in-depth studies of selected projects could be commissioned in order to provide hints on how to better deal with institutional complexity and dynamics.

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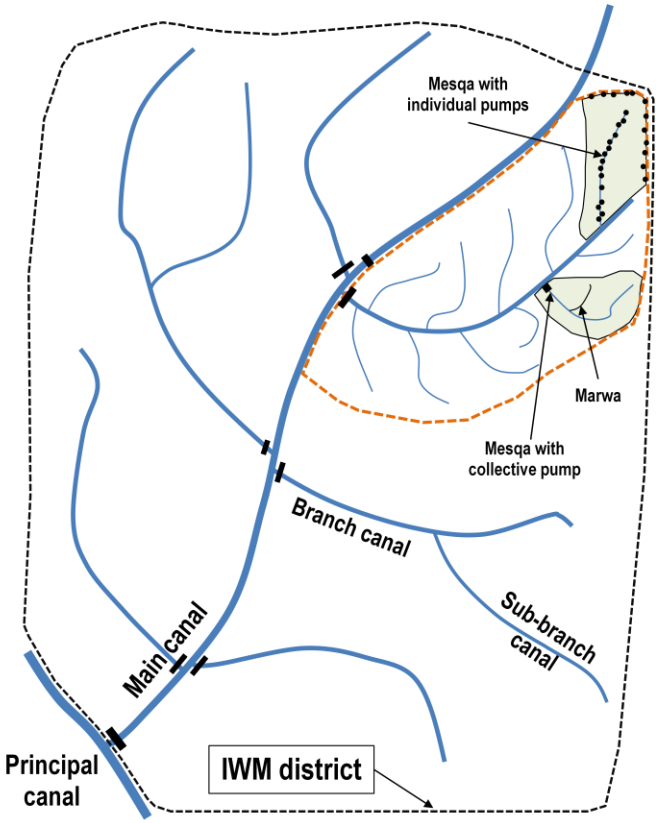
11 Annexes

11.1 Annex 1: Brief retrospective on Water User Organizations in Egypt

Introduction

Egypt has a rich experience with the development of WUOs 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 on this rich experience and draw some lessons for the future. A full-fledge analysis of the numerous initiatives and projects would however be a huge task and this section limits itself to providing a summary chronology before addressing the difficulties that have been faced and the attitudes from farmers, managers, and donors. Because of its importance the Irrigation Improvement Project (IIP) is given some more in depth consideration.



Mesqa
5-100 ha
< 100 farmers

Branch canal
400-3000 ha
1000-15,000 farmers
< 15 villages

IWM district
8000-25,000 ha
40,000-100,000 farmers
~12 branch canals
30-100 villages

Governorate
200,000-500,000 ha
>1,000,000 farmers
>500 villages

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 management (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 mean that collective action is needed for operating and maintaining the pump, organize water distribution, and pay for energy costs.

Initially WUAs 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 (Decree No 14900 of 1995) detailed the rights and duties of the WUAs and WUUs.

In 1995 the Dutch-funded Fayoum Water Management Project 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.

More or less at the same time, between 1994 and 2009, another project (The Fayoum Water User Organizations project, also Dutch-funded, in two phases) 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, under the title of a Water Users Federation of Water User Unions [WUUs]), was formed in free-flowing deep groundwater area.

Setting up BCWUAs involved several steps, including obtaining legal authority (by 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 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 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 exiting 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) 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 I: 2008-2012), 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).

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 consisting in establishing IWM 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*[9] boundaries do not correspond,

[9] *"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).*

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).

Relatively recent assessments of participatory water management (APP, 2007) has 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).

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 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, 2004); “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” (Hvidt, 2004). 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 of water shortages, and rightly seen as "important to assure the success of the project" (Metawie, 2002).

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.

Problems faced[10]

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.

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).

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[10] 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".

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 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).

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), and as result continuous flow could not 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).

Construction Quality

Contracting procedures and contractor performance have remained a strong concern up to these days. "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.

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.

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 include: short branch canals, abundant supply from parent canals, cohesive communities.

BCWA and districts: what benefits and roles for farmers

The rationale for BCWUAs in irrigated agriculture were 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 WUO'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 WUO's but the execution is now managed by the MWRI, although WUOs 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 as well. 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 (Table2). +The overhead costs for the Water Boards for running their organization are estimated to reach about LE 15/feddan per year (Abdel-Aziz, Y. 2003).

The BCWUAs established in the IWRM 1 project (USAID) have been assessed by means of questionnaires files 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 tin 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. No more in-depth assessment of these BCWUAs has been carried out yet.

Perspectives from different stakeholders

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 voluntarily manner because they saw that the Water Board served their interests, and were even "enthusiastic" due to the feelings that they had a say in resource allocation of the ministry (water and maintenance) (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. But when asked whether specific maintenance operations should continue being carried out by the government or managed by the private sectors or the water users, there was not a single maintenance operation where less than 65% of water users thought the government should continue management (Moustafa, 2004). When asked about maintenance in a way that makes clear that costs will be on them and works achieved by the government there was clearly (and expectedly) no support for taking over this burden. When asked the same question in a context where costs are shouldered by the project (e.g. Water Boards) or where WUAs feel empowered and involved in the definition of what has to be done and which work should be prioritized, or directly in the execution of the works by either being hired to do some of the maintenance work or be in a position to jointly tender maintenance activities, then adhesion to what is proposed normally increases.

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 land slides, 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 than 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).

Acceptance or reluctance: The ministry

This leads us to turn our attention to the side of the government in general and of the Ministry of Water Resources and Irrigation 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 ministry of water resources and irrigation.

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 handles 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, trainings and lobbying efforts helped to provide the "bureaucratic orientation" required (Aziz, 1995).

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 self-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 comes 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).

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. 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".

Limited partnership with farmers

Barakat[11] (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.

Donors' enthusiasm

Development bank and aid experts have ben 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.[12] 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 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., 1998a) 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).

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[11] *Based on a questionnaire filled by a sample of water managers and users.*

[12] *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).*

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.

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. 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.

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) though a typical "muddling-through" 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. 1998). There has also be discussions about the timing of establishing WUOs, mesqa WUAs being established before, at the same time, or after BCWUAs (World Bank, 2005) according to different sources. 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), while still others promote establishing "water user organizations at the branch canal level, allowing for eventual expansion to the district level" (IRG, 1999).

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 acceptation 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. 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, legitimacy or even job (Hvidt, 1998) and, generally, it is somehow odd to expect from the very line agencies poised to lose power 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. 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.

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11.2 Annex 2: Overview of IFAD's project achievements

Country	Project	Components*	Technical achievements	Institutional achievements
Tunisia (Small-scale irrigation systems)	**Programme De Developpement Agro-Pastoral Et De Promotion Des Initiatives Locales Du Sud-Est (PRODESUD)**	a- Structuring investments of general interest b- Integrated management of socio-territorial units c- Promotion of sectors and improving productivity agro-pastoral d- Promotion of micro-enterprises and rural ***economic initiatives***	- Implementation of 6 new tube wells - Equipment of 6 wells with pumping stations and photovoltaic cells - Rehabilitation of 7 wells - Construction of 8 reservoirs (total capacity of 2,440 m3) - Increasing storage capacity for 5 other reservoirs (total 770 m3) - Establishment of 114 km of pipes for pastoral water supply - Deepening 45 shallow wells - Rehabilitation of 29 water cisterns - Creation of 12 new water cisterns	- Creation of 27 formal GDAs, 10 of them managed irrigation schemes - Training of 237 members of board directors in aspects of technical, administrative and financial management - 22 GDAs have their office.

* When the component is **bold** it addresses Participatory Irrigation Management and when it is ***bold and italic*** it addresses marketing and financial issues

Country	Project	Components	Technical achievements	Institutional achievements
Tunisia (Small to medium-scale irrigation systems)	**Projet De Developpement Agricole Et Rural Integre De Siliana (Phase I)**	• Water and soil conservation • Sylvo-pastoral systems and live-stock production • Agricultural development • Research and development	• - Rehabilitation of 02 spate irrigation systems - Creation and rehabilitation of 13 well schemes - Installation of hydro-mechanical equipment in 03 irrigation schemes - Rehabilitation of 04 irrigation schemes	Creation of: 11 mixed GDAs (irrigation water and potable water management), 03 GDAs for management of irrigation schemes, 03 female organizations. Consolidation and equipment of 30 existing GDAs (27 potable water management, 02 irrigation water management, 01 mixed) (-) The project failed to develop a clear vision for the future and integrated rural development. The main limiting factors were: a limited capacity of communication, training and technology transfer to a limited number of beneficiaries and low participation of farmers in the definition and programming of interventions.

Country	Project	Components	Technical achievements	Institutional achievements
Tunisia (Small to medium-scale irrigation systems)	**Projet De Developpement Agricole Et Rural Integre De Siliana (Phase II) (ongoing project)**	**a- Integrated local development** ***b- Development of small and medium-sized business and open up access to the labor market*** • c- **Institutional enhancement** • d- Sustainable soil management	• - Creation and electrification of 05 new collective tube wells and their corresponding irrigation schemes • - Creation of a hill dam and its correspondent scheme (S'mati: 177 ha and 60 beneficiaries) • - Rehabilitation of a spate irrigation system (Oued el Oud around 300 ha)	In 2010, 42 farmers were trained in the themes: - Management of irrigation networks at the field level in order to increase water use efficiency - Animal husbandry: Beneficiaries were supported to have loans to buy a cow (-) The project has not implemented an effective approach to local participatory planning in terms of identification, location, design and programming of actions (+) Only in the Bargou area several groups and associations were created and functioned well

Country	Project	Components	Technical achievements	Institutional achievements
Tunisia (Small-scale irrigation systems)	**Projet De Développement Agricole Intégré Dans Le Gouvernorat De Zaghouan**	a- **Community development** and promotion of woman's role b- Conservation of water and land c- Silvo-pastoral systems and livestock • d- Hydro-agricultural development • e- Agricultural Development • f- Improvement of socio-***economic infrastructure***	150% of the original target was reached in irrigated agriculture Main achievements : - Creation and equipment of 05 deep tube wells - Equipment of 07 deep tube wells - Equipment of 738 ha with irrigation network and water saving systems within 12 new schemes and 07 old schemes - Creation of 45 shallow wells - Dredging of 60 shallow wells Equipment of 156 shallow wells •	The project has achieved its 'quantitative' objectives in terms of promotion of users' organization: - Revitalization of existing 07 GDAs in rehabilitated schemes - Creation of 12 GDAs in newly created schemes The 'qualitative' objectives, in terms of performance and durability, were barely achieved. (-) Training and supervision initiated in the project did not promote the emergence of a sufficient number of dynamic GDAs, which are able to provide support and handle operation and maintenance in the project. Constraining were the irrigation management and the weak development of economic activities, which prevented the generation of revenues for O&M. (-) Institutional constraints: - lack of capacity and strategy to support and advise GDAs - GDAs are not representative and unable to assume management responsibilities - low autonomy of GDAs and strong dependence on Ministry - Absence of an organization able to defend GDAs' interests vis-à-vis third parties

Country	Project	Components	Technical achievements	Institutional achievements
Azerbaijan (Large-scale irrigation systems)	**North-East Development Project (NEDP)**	**a- Participatory Irrigation Management** • b- Agricultural and ***Marketing*** Development • c- Rural ***Financial Services***	- Investment support for water supply comprising 20 km of laid pipes, 4 collection tanks and 3 livestock watering points - The rehabilitation work impacted 30,893 ha. The supply of irrigation water per ha increased from 1,514 m3 in 2007 to 2,960 in 2011 after rehabilitation, resulting in better supply according to crop water requirements to achieve yield increases	Six pilot WUAs were established and supported under the Farm Privatization Project (FPP) to manage the rehabilitated on-farm irrigation and drainage systems. A further 546 have recently been established, based on the FPP model but without the support that the FPP WUAs received. Consequently, these new WUAs suffer from lack of resources (e.g. budgets, equipment, etc.) Preparation of O&M plans and irrigation fee structure for 200 WUAs (-) The lack of an appropriate legal framework and the deteriorated state of the irrigation & drainage system (-) Limited knowledge about WUAs among members and its leaders are seen as people who are not accountable to the membership. (-) A WUA is mainly seen as an organization to distribute water and collect the water charges for government, rather than a genuine farmer-led organization with the mandate of managing the irrigation and drainage infrastructure.

Country	Project	Components	Technical achievements	Institutional achievements
Egypt (Large-scale irrigation systems)	**West Nubaria Rural Development Project (WNRDP)**	• **a- Community development** • b- Technical operations, crop and livestock production and development, and water management • c- ***Marketing*** operation support • ***d- Credit facilitation and enterprise development***	- Improved on-farm irrigation systems: Since the start of the project, there has been a continuous change of the prevailing irrigation systems from hand moved sprinkler irrigation to improved drip irrigation system; - The cumulative area reaches 15,000 feddan. Investments in conversion to improved drip irrigation systems have been financed through loans to WUAs on a 50% matching grant basis.	The total number of registered WUAs is 119. 05 more WUAs are awaiting registration. The aggregate WUA membership is 5,680 water users and the area served is 20,193 feddan, which comprises only 30% of the irrigated project area. However, among the 119 registered WUAs, only 67 are active and of those only 7 have opened and use bank accounts. WUA boards need to be trained in management, accounting and business planning. In addition, larger WUAs should be encouraged to recruit an accountant for record-keeping and managing financial transactions

Country	Project	Components	Technical achievements	Institutional achievements
Jordan (Small-scale irrigation systems)	Yarmouk Agricultural Resources Development Project (YARDP)	a- Resource development: On- and off-farm soil and water conservation measures and spring protection and irrigation b- Agricultural development: including **institutional support at district level**, training and extension for soil and water conservation and agricultural activities • c- Rural Roads d- ***Financial Services***, including credit for development and/or rejuvenation of orchards, construction of soil and water conservation measures by private sector, and income generating activities for women	• - Rehabilitation of 17 springs, which makes water available to irrigate 149 ha (or 43% of the targeted 350 ha). • - Construction of contour stone walls, of which achievement exceeded the targeted 2000 ha (122%), • - 77% of the cisterns are completed • - Earth contour banks (40% of the target) • - Only about 9084 m3 (36% of the target) of gabion structures have been placed on wadi (river) banks • - Construction of small earth dams, no progress has been made to date. The reason was all sites identified as suitable for construction of the dams are located in private farms and none of the farmers have accepted to construct dams. • About 4,253 farmers have benefited from the various on-farm soil and water conservation activities.	No water user's associations were formed. No arrangement in place to manage and eventually maintain these systems. • The concept of organizing WUAs to manage and maintain irrigation systems is relatively new in Jordan. It is being advocated and promoted by irrigation projects, but the examples are few in Jordan.

Country	Project	Components	Technical achievements	Institutional achievements
Jordan (Small-scale irrigation systems)	Yarmouk Agricultural Resources Development Project (YARDP II) (ongoing project)	a- Providing technical and ***financial support*** to construct soil and water conservation measures and improve agricultural production through active participation of the target group b- Promoting sustainable land management practices and supporting environmental monitoring c- Promoting ***rural micro-finance*** for on- and off-farm activities	Main achievements (% of planned): - On-farm soil conservation (30%) - water harvesting cisterns (60%0 - construction of mini-dams (0%) - orchard establishment (46%) Off-farm soil and water conservation: - wadi bank protection (78%) - roman well rehabilitation (67 %) - spring irrigation rehabilitation (106 %)	Community development for the strengthening of Community-Based Organizations (CBOs) and for the training of women in social and technical fields to generate income

Country	Project	Components	Technical achievements	Institutional achievements
Yemen (Small-scale irrigation systems)	Dhamar Participatory Rural Development Project (DPRDP) (ongoing project)	**a- Community Development** b- Agriculture and Livelihood Development and Environment **c- Institutional Strengthening**	- Establishment of 8 **dams** with the potential to irrigate 163 ha for 1,100 households in hilly areas. - Introduction **new irrigation and water conveyance systems** with 22 demonstration piped irrigation systems - Drip irrigation systems installed for peach and other fruit tree orchards. Demonstration farmers were satisfied with new systems and willing to share experiences and knowledge with others.	8 water users' associations (WUAs) have been created and trained in the O&M of water storage reservoirs. However, only one WUA is currently operational. It is encouraging to note that the WUA is selling water to users and intends to use the proceeds to cover maintenance costs. The weakness of some of the users' and development committees who still have a very limited competence in operating their infrastructures, managing their community institutions, initiating new activities or raise funds within or outside the community.

Country	Project	Components	Technical achievements	Institutional achievements
Morocco (Small to medium scale irrigation systems)	Projet De Developpement Agricole Dans Les Zones Montagneuses De La Province D'al-Haouz	**a- Capacity building and promotion of local development** b- Support of ***financial services and Promotion of micro-enterprises***	At the end of the loan, the total completed area was 4816 ha (or 120% compared to the initial target of 4000 ha) within 91 programmed schemes. The works consisted mainly in: - Lining earthen canals for a length of 172.9 km • - Construction of 41 catch basins • - Rehabilitation of 11 catch basins • - Construction of 8 deviation outlets	156 organizations were established and 52 other existing associations strengthened. The project has assisted in the formation of 61 WUAs of which 48 are functional. Currently, each village (or *douar*) or group of *douars* has an association. These associations were formally integrated at the municipal level and two association offices were created. However, these two spaces were not functioning because of a lack of planning and competence.

Country	Project	Components	Technical achievements	Institutional achievements
Morocco (Small to medium scale irrigation systems)	Projet de Développement Rural de Taourirt Tafoughalt (PDRTT)	a- Agro-pastoral development, small and medium hydraulic, destoning of agricultural b- Research and development, **strengthening** of extension services and support to veterinary services • c- Socio-*economic component* which includes actions for women and unemployed youth and potable water for villages	The project achieved: - almost all the planned agricultural schemes, except two spate irrigation schemes • - trenching area of 3700 ha (100%) • - de-stoning of 2863 ha (77% trenching area)	The project area has more than 248 professional organizations (cooperatives and associations) involving nearly 10,000 members (about 70% of farmers in the project area), covering diverse activities, such as bee-keeping, rangelands, livestock and genetic improvement, agricultural water use, income activities for rural women and processing of agricultural products. 29 AUEAs were managing rehabilitated schemes The training involved 11 AUEAs in small-scale schemes and 9 AUEAs in spate systems. The training has strengthened the capacity of AUEAs to become more efficient and dynamic. Meetings are regularly held, the attendance rate averaged 80%. The rate of fee collection reached and exceeded 85%. Costs of management and maintenance significantly reduced. Improved management of water resources and rationalization of its use, which is likely to promote the sustainable management of water resources.

Country	Project	Components	Technical achievements	Institutional achievements
Sudan (Small- to medium-scale spate irrigation systems)	Gash Sustainable Livelihoods Regeneration Project (GSLRP) (ongoing project)	a-Irrigation infrastructure rehabilitation b-Animal production and rangeland management • **c-Community development, capacity-building and empowerment** • d-***Financial services and marketing***, and Institutional support and management	The aim of the component irrigation infrastructure rehabilitation is to enhance the capture of flood waters through: a- better control of river flow • b- reconstruction of the six main canal systems • c- improvement of access roads and changes in field layouts. - The Project supports engineering interventions to restore main canals to their design capacity - Inlet structures will be repaired or new ones installed - Existing inlets from the main canals will be repaired or replaced - Regulator devices will be substituted.	92 WUAs were formed (at completion 106 will exist). Each WUA elects two representatives to the overarching WUA organisation at the Scheme level 361 members of WUAs were trained during 2006 to 2008 on 14 different topics. WUAs were formed mixing kinship relations and tribal affiliation. None of the WUAs is ethnically or tribally homogenous. WUAs have been introduced by the project and slowly adopted at all levels (farmers; GAS, State, Farmers Union). The speed at which this has taken place has been constrained by the development of the land tenancy ownership and the subdivision and pairing of land.

11.3 Annex 3: Distribution of responsibilities

Level	Water management	Maintenance	Financial management
JVA, Jordan. Automated main canal			
Main	JVA plans water allocation according to available resources, land use, and quotas (reduced in case of shortage).	Maintenance fully under JVA	Costs fully supported by JVA
Secondary (pressurized system)	Water management of the pressurized system is handled by the Association. Ditch riders and irrigation engineers are hired by the Association. Individual consumptions are recorded and must be equal to the farmers quota; the total consumption must match the associations quota.	Small maintenance is carried out by the Association. However, major repairs generally exceed farmers capacity -both technically and financially. Likewise rehabilitation costs and technical improvement carried out before the establishment of the Association.	Farmers pay a water fee (not updated since 10 years, and currently rather minimal), proportional to their quota (which varies according to the crop cultivated); the receipts go the to state coffers. Farmers also pay a membership fee that goes to the bank account of the corporative (WUAs are currently formed under the corporative law) the Association enters in contract with the JVA and receive a yearly amount to pay for technical staff and small repairs.

Level	Water management	Maintenance	Financial management
South Bekaa Irrigation and Drainage System (Known as canal 900): Average area: 600 ha. Modern pressurized system. "Secondary canal" is canal 900 and "tertiary" are the 4 sub networks (supplied by three pumping stations)			
Secondary	Fully managed by the agency ***Allocation:*** available supply depends on the amount of water that pumping stations can transfer to intermediate reservoirs, which depends on their capacity and the starting date of the season. ***Scheduling***: canal operates with continuous supply (?) transferred from the Qaraoun dam by pumping.	Fully done by the agency. Start of canal cleaning decided by the agency (cleaning can't start before rain completely stops) and conditions start of cropping season (often delayed) Farmers are not satisfied because cleaning of canal delays the date at which delivery starts.	**System as a whole (Secondary and tertiary) has the same financial management.** All costs directly borne by the agency. Contribution of farmers via water fee collected by the agency. Water fees are set by the agency at: 50$/0.1 ha/year.
Tertiary	Fully managed by the agency ***Allocation:***1l/s per 0.8 ha. No overall volume defined but individual consumption limited by the network capacity itself **Distribution and scheduling**: Decided by the agency, based on available supply/demand. **Note:** Recently, agency is trying to involve in the distribution process, and each of the subnetworks, stakeholders who play a key role in land rental process	Fully done by the agency. Repair of hydrants or network pipes is restricted to the agency as farmers are prohibited from repairing their hydrants/pipes.	**System as a whole (Secondary and tertiary) has the same financial management.** All costs directly borne by the agency. Contribution of farmers via water fee collected by the agency. Water fees are set by the agency at: 50$/0.1 ha/year.

Level	Water management	Maintenance	Financial management
Tadla irrigated scheme (Morocco). One WUA (AUEA) by tertiary (20-30 ha). Agency managing the scheme: l'Office Régional de Mise en Valeur Agricole de Tadla (ORMVAT)			
Secondary	ORMVAT plan seasonal water allocation according to available resources, land use, structural constraints. Farmers have quotas.	Maintenance 100% by ORMVAT	Costs by ORMVAT
Tertiary	The gate keeper collects the requests from all individual farmers, prepares the rotation schedule for all of them (with starting and finishing hours) and then establish the duration of supply to the corresponding tertiary. The information is passed upward in order to prepare the overall distribution schedule. In return on Thursdays farmers get a ticket with the details of the supply to their fields in the following week (there is a turn per week), as well as the ditch rider (paid or nominated by the WUA) who distributes water within the tertiary. The system is somehow 'on demand' but request are capped by the seasonal quota defined by ORMVAT.	Maintenance 100% by ORMVAT. Note that tertiary canals are concrete elevated canals	Billing is individual and proportional to the volume supplied (calculated as the discharge (30l/s) multiplied by the number of hours 'on'. The rate is $US 4 cents/m3. It is paying part of the « water service ». Billing is done twice a year. WUAs nominate and possibly pay for the ditch rider which implement the rotation within the tertiary level.

Level	Water management	Maintenance	Financial management
Turkey			
Secondary	Irrigation Associations IAs identify the total water demand, DSI allocates the water volume from the reservoirs to the secondary level No bulk allocation specified	Irrigation Associations maintain infrastructure. They rent machinery from DSI or sometimes buy their own	"Pricing of water fees are determined on water prices lists prepared by association technical personnel and approved by Association Council and collected as whole in advance, or in installments. The collected money is used for operational costs of the association and for repair and maintenance. The assistance is requested for costly repair and maintenances from DSI" (Kodal et al. 2005). The DSI allows the WUGs to collect an amount between 20 and 40% of the annual water charge
Tertiary	Informally organized groups of water users within the tertiary units. The WUAs take the responsibility of allocating the water flows within the tertiary distribution canals to individual farmers and perform simple maintenance repairs	Irrigation Associations	Part of the water fee for tertiary level O&M

Sudan, Gezira Scheme			
Level	Water management	Maintenance	Financial management
Secondary	Since 2010: Gezira Scheme's Management Body (Government with farmer representation) Security companies doing O&M and employing ghaffirs (canal operators) No defined bulk	Gezira Scheme's Management Body Security companies that do maintenance	Gezira Scheme's Management Body sets water fee, WUAs collect with assistance of security companies

	allocation		
Tertiary	WUAs, ghaffirs and sometimes farmers	WUAs and sometimes farmers mobilize to attract a machine worker	WUAs collect fees with some assistance of security companies

Level	Water management	Maintenance	Financial management
Kyrgyzstan: Osh Province (Kazbekov et al., 2009)			
Secondary	(District) Canal Management Organization (CMO) CMOs reconcile water plans with water availability and adapts water plan Ministry of Agriculture adjusts plans proportionately CMO and WUA sign annual water delivery agreement on this basis CMO releases water: actual supply depends on pragmatic considerations No clear bulk allocation Limited role WUAs	District and interdistrict canal maintenance units Maintenance capacities and activities depend on financial resources available to DCMO WUAs lack equipment and financial and professional capacity for maintenance and rehabilitation Donors sometimes fund rehabilitation	ISF based on volumetric charges determined by Parliament, payments according to water delivered Approximately 50% of O&M costs covered by government WUAs
Tertiary	WUAs and informal water user groups WUAs aggregate individual demands or collect info on cropped area and cropping patterns. WUA submits water plan to CMOs Water user groups and WUA operate the on-farm and inter-farm level (of the former collective farms)	WUAs and water users Occasional 'voluntary' collective work organised by local authorities or WUAs (ashar), mostly for small canals	WUAs Charges for WUA services vary per WUA and total charges per user are crop and area based (volumetric is rare). Water users pay ISF without guarantee that water stipulated in contract between WUA and users is delivered

Azerbaijan			
Level	Water management	Maintenance	Financial management
Secondary			
Tertiary			