IMPLEMENTATION OF IRRIGATION MANAGEMENT TRANSFER IN IRAN: A PROPOSED FRAMEWORK

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ABSTRACT

Iran is facing a serious water scarcity and the government is making serious efforts to adopt technical and institutional measures to meet the challenge. One of the key strategies being persuaded is the devolution of management responsibility to users. Thus Irrigation Management Transfer (IMT) has been adopted as a key strategy to improve the operation and maintenance, reduce losses and enhance sustainability of irrigation infrastructure. However, IMT efforts are at an inception stage and are largely happening in areas where infrastructure is under rehabilitation. The key objective of this paper is to review the on-going IMT efforts in the two provinces of Iran, as well as the lessons from the neighboring countries, and propose a viable framework for implementing IMT. To get the first hand information of the IMT activities in Iran, field visits were carried out in the provinces of Qazvin and Karmanshah where two big pilot projects are being carried out. At the end, paper proposes a framework for the implementation of Irrigation Management Transfer in Iran.

Keywords: Irrigation management transfer, Iran, water user associations, irrigation reforms, farmer organizations, water management

INTRODUCTION

The populations and governments of water scarce countries face the challenges of optimizing allocation and utilization of the limited water resources for food production, and rural livelihoods. The challenges are further compounded by the emerging competition from the non-agricultural uses, and the environment (Molden and Boss, 2005). Governments tend to revisit their policies and introduce institutional reforms to re-allocate water and utilize it efficiently to optimize benefits and conserve the environment. Policy objectives of reforms differ greatly (Vermillion and Sagardoy, 1999), and thus achieve varying outcomes. In addition, while considerable preparatory

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inputs are usually provided to prepare policies and legal frameworks, a necessary but not sufficient condition for achieving the desired objectives (Prathapar et.al., 2001; Molle, et. al., 2004), the enforcement mechanisms generally receive less attention. Water reforms, if not conceived and implemented well, can lead to further deterioration of the situation rather than improving it (Kendy, et. al. 2003) and often might actually hit the poor hardest (van Koppen, et. al, 2002). Iran, an extremely water scarce country, in its intent to search for solutions for optimizing the use of water resources, intends to devolve water management to local level institutions, and some efforts have been piloted.

Iran is one of the most water scarce countries and faces the multiple challenges of a rapidly growing population, limited freshwater availability and over-exploitation of groundwater. In this context, the Iranian government has embarked upon various policies aimed at improving the productivity of land and water resources. One of such policies is devolving the responsibility and authority of irrigation management to users through irrigation management transfers. This paper documents the outcomes of the establishment of Water Users Associations (WUAs) in Iran, and the issues around these reforms, and proposes a framework based on the lessons learned from Iran and elsewhere in Asia.

This paper describes the context in which IMT is taking place in Iran. It reviews the existing operation of IMT in two pilot areas i.e. Karmanshah and Qazvin. The paper also discusses the lessons learned in IMT n other parts o the world and finally propose an IMT Framework for Iran.

IRANIAN CONTEXT

Iran, one of the oldest civilizations of the world, is situated in the Middle-East region of the South-Western Asia and is located between 25^{o} and 40^{o}N and 44^{o} and 63^{o}E. The national territory covers a total land area of about 1.65 million Km^2. Iran is the most populous country of the region, and the 16^{th} most populous in the world. The total population is about 67.3 million (1995)[1], of which 41% is rural. The population living in urban areas has increased by 14% during the last three decades. Currently, 61% people are living in urban areas as compared to only 47% in 1976 (Shiatti, 1999). This fast urbanization has increased the domestic and industrial demand for water, which has put enormous pressure on the agriculture sector to reduce its consumption of water and increase the productivity of available water resources. In order to sustain agriculture, serious efforts are needed to generate economic activity in the rural areas to restrict migration of rural population to cities.

Although climatic conditions of Iran are typically of an arid and semi-arid region, it enjoys a wide spectrum of hydrological conditions. Annual rainfall ranges from less than 50 mm in the deserts to more than 1600 mm on the Caspian Plain. The average annual rainfall is 252 mm and approximately 90% of the country is arid or semiarid. Overall, about two-thirds of the country receives less than 250 mm of rainfall per year.

1- According to the other literature, the population is 60 million based on 1996 statistics, of which 38% lives in rural areas. The average population density is also reported as 36 inhabitants per km^2 (Shiati, 1999). The average rate of population growth is reported as 3.91% during 1976-86, 2.46% over a period of 1986-91 and only 1.47% from 1991-96.

Agriculture accounts for about 25% of the country's GNP and employs about 27% of the work force. Over the recent years, the agriculture sector has achieved a growth rate of 5% with some fluctuations mainly due to changing climatic conditions. A high proportion of farms are considered small in size. About 70 % of the landholders possess less than 5.5 ha (of which on average 2.13 ha irrigated and 3.25 ha rain-fed). These are generally subsistence farmers with no surplus products for sale. Their farm incomes are low because landowners exploit the labor of sharecroppers to earn more profit. Women constitute a large proportion of the agricultural labor force. Rural women play a very important role in animal husbandry. Women do more than 86% of the milking, and 42% of the feeding, watering and health care of animals. Women also carry out 90% of the milk processing, both for home consumption and for sale.

During the past two decades, Iran continues to experience a slow transition from a traditional rural-based society to a semi-industrialized society. This has brought many challenges for the local people that include high unemployment rate (presently estimated to be above 25%), distorted distribution of income and inequity in opportunities for growth. Although official figure for poverty in Iran is set at 18% of the population, more than 16 million people (about 25%) are estimated to be living under the poverty line.

WATER RESOURCES AND IRRIGATION MANAGEMENT

Internal renewable water resources of Iran are estimated to be 130 km³/year. Surface runoff amounts to 97.3 km/year, of which 5.4 km³/year comes from drainage from aquifers (spring flows), and groundwater recharge is estimated at about 49.3 km³/year, of which 12.7 km³/year is obtained from infiltration through river beds.

According to 1998 estimates, the total water consumption is approximately 88.5 km^3, out of which more than 93 percent is used for agriculture while less than seven percent is allocated for domestic and industrial uses (Kehsaverz et al, 2003). The use of groundwater for irrigation purposes is much higher in Iran as compared to many other countries of the world (Table 1). Presently, more than 50% of the water available at the farm gate comes from the groundwater. The current estimated annual groundwater abstraction is about 55 BCM compared to annual recharge of only 46 BCM. Due to this 9 BCM annual overdraft, groundwater tables are declining in many areas. Pumped groundwater is used for irrigation both in isolation and in conjunction with the surface water, which is creating serious salinity threats in the irrigated areas.

Despite the shortage of water, the over-use of water in irrigation is a major problem in Iran. At present, a big gap exists between water delivery from main canals and water application in the field. The overall efficiency of irrigation systems ranges from 33% to 37% (Keshaverz, et al., 2003). In practical terms, therefore, much surface water is lost enroute, which, if salvaged, could be profitably used to bring more areas under irrigation.

INSTITUTIONS FOR WATER MANAGEMENT

Until the early 1990's, water management for agriculture at the local level was part of communal responsibilities. The communities diverted the canal flows to earthen

secondary and tertiary canals, and the silt clearance and strengthening the embankments were the only water management activities that were collaboratively performed through village organizational structures. These communal organizations were responsible for not only water management but also for other communal activities such as weddings, funerals, religious ceremonies, education, etc. Decision making was undertaken in communal meetings that were chaired by the village elders and attended by heads of households. Water distribution was done according to the equity concept perceived by the community members, and water was distributed in rotational turns. The main canal was perceived to be government's property and responsibility.

Table 1. Groundwater use for irrigation in selected countries.

Country	Irrigated area (million ha)	Irrigation use (km^3/year)	Proportion of groundwater (%)
India	50.1	460	53
China	48.0	408	18
Pakistan	14.3	151	34
Iran	**7.3**	**64**	**50**
Mexico	5.4	61	27
Bangladesh	3.8	13	69
Argentina	1.6	19	25
Morocco	1.1	10	31

Source: (Qureshi, 2004)

In the 3rd Five Year Development Program (FYDP: 2000-2004), the government recognizes that the potential for water resources development in Iran is very limited and therefore more emphasis should be given to conserve water at all levels. The government, thus, encourages the promotion and creation of Water Users Associations (WUAs) to devolve irrigation system management responsibility and authority at the local level, whereby the traditional local authorities would be able to coordinate water management within their community and be part of the WUA at the (sub)system level. As a result, the process of creating WUAs along all tertiary canals and federating them up to the main canals for irrigation system management has started.

Apart from the informal collective action at the community level described above, a number of formal institutional structures exist, which are responsible for collective action at the village level. These include Village Islamic Council,Rural Cooperative Organizations (RCOs) and Rural Production Cooperatives[1] (RPCs), Well Cooperatives and Water user Associations (WUAs).

1- A cooperative can be a small group of people with a minimum membership of 7 people. There is no limitation of maximum membership. A cooperative normally comprise of 3 to 5 board members (managing director, deputy director, secretary and members). The cooperatives can be established for all sectors. In Iran, the cooperatives established for the agricultural sector involve agriculture (both green house and field crops), animal husbandry, agro-industry (shoe making, carpet making etc), processing and facilities and operation and maintenance of irrigation infra-structure.

IMT IN IRAN: EXPERIENCE FROM TWO IRRIGATION SYSTEMS

For the limited scope of this study, the experience of WUAs in two different basins is reviewed below. The WUA in Kermanshah Province (Gharasu tributary located in the upper reach of the Karkheh Basin, and organized along the territorial principles of villages) was studied by PCI (PCI , 2004) and the one in the Qazvin Province (Qazvin Pilot Project) organized along hydrologic boundaries of Qazvin canal) was visited by the authors together with a study team from Bureau of Extension of the MoJA (Figure 1). The irrigation systems in Kermanshah Province are under rehabilitation, while those in the Qazvin province were rehabilitated some 20 years ago. The key findings of these assessments are given in the following section.

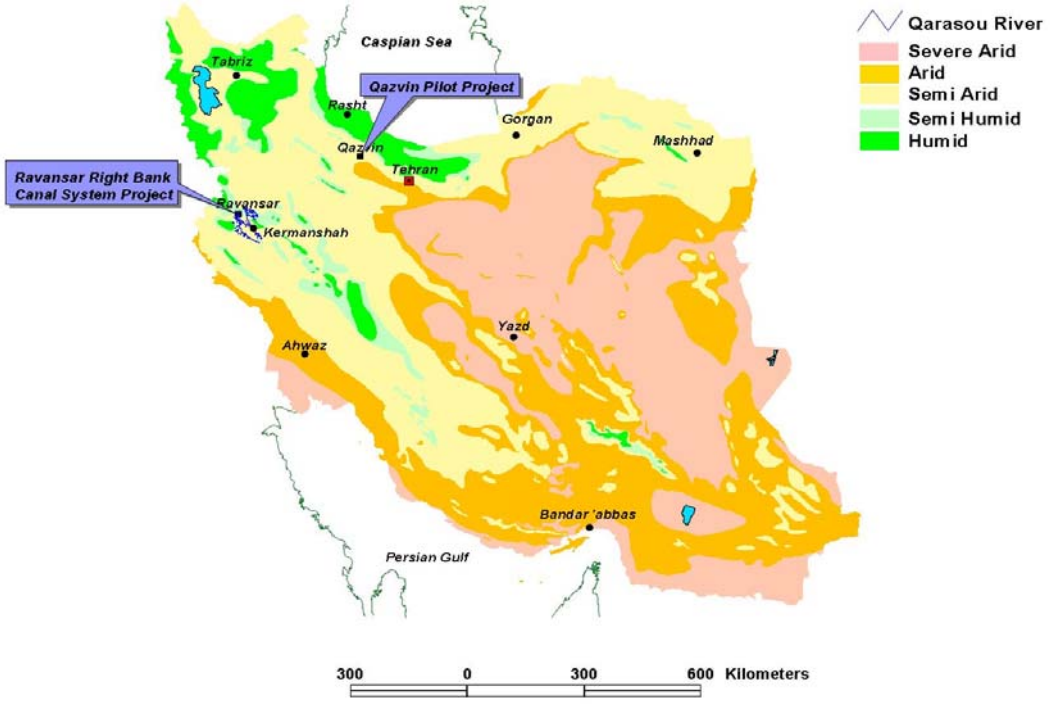

Figure 1. Map of Iran showing locations of two pilot projects studied.

RAVANSAR RIGHT BANK CANAL IRRIGATION SYSTEM IN KERMANSHAH PROVINCE[1]

The study area is located in the center of *Sanjabi* plain, which is surrounded by mountains and has mountain climatic conditions. The rainfall at Ravansar is about 527 mm of which 90% occurs in November to April (PCI, 2004). The water resources used for irrigation are derived from surface sources, springs and groundwater. However, the main source is the *Gharasu* River, especially during the dry season. Additionally, the two seasonal rivers, *Gharab* and *Kilanba*r rivers only provide water during rainy season. The *Gharasu* river receives an important part of its flow during the dry season from the

1- The information presented in this section is extracted from a recent JICA Study reported by (PCI, 2004).

Ravansar Spring, along with *Jaberi*, *Ghar Daneh* and *Mir Azizi* Springs. There are 352 registered wells in the Ravansar command area and the amount of approved groundwater extraction is 45.24 MCM sufficient for about 5000 ha.

Most of the irrigation systems are multipurpose in nature and serve irrigation, flood control, improving inundation and groundwater recharge purposes. Average land holdings are generally smaller than 5ha, and due to absentee landlordism, a number of holding are cultivated through sharecropping arrangements causing fragmentation of operational holdings. The Ravansar Irrigation system comprised Ravansar Right Bank Canal with a 700 ha command area and Ravansar Left Bank Canal with a command area of 2000 ha. In addition, some 175 pump owners had been allowed to extract water directly from the river to irrigate about 1000 ha. Some 20 un-licensed pumps were also operating in 2003 (PCI, 2004: 3-34). The operation of the Ravansar diversion gates are carried out by the Ravansar Water Affairs Office (RWAO), while the on-farm activities are done by the provincial branch of agricultural ministry.

The water users of secondary canals are more or less the same farmers, whose lands might be located along several watercourses. Two IMT models had been tried out. In 2000, O&M of the irrigation system was initially transferred to a semi-government company (Western Regional Water Utilization and Delivery Service Company-WRWUDSC) for water fee collection and O&M of the canal. Later, in 2003, a Water Users Cooperative Company (WUCC) was formed and the following organizational structure in was imposed with the MoC responsible for establishing the WUA (Figure 2).

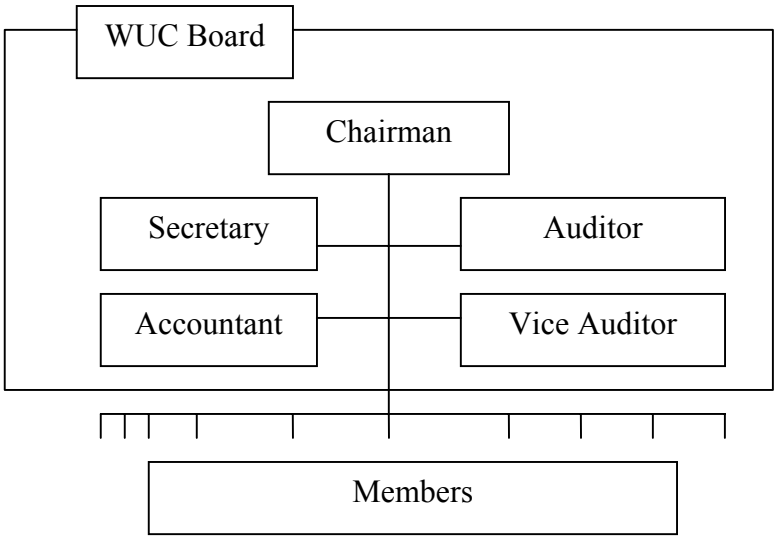

Figure 2: Organizational Structure of Water Users Cooperative for the Ravansar Right Bank Canal

The rights and responsibilities of the WUAs were largely perceived as the O&M contractors to the MoE, rather than independent local organizations managing water on behalf of the water users. WUAs in the Ravansar irrigation system were not clear about the respective roles of MoE as "water supplier" and MoJA as responsible for provision of advice on crops. Thus, the farmers remained uncertain about where to go for the solution of their problems. Due to lack of clarity about the objective of WUAs amongst

the local government staff, the central government's intentions of improving water management through the participation of local farmers has not been properly communicated. As a result, true participation of farmers has not happened to support successful WUAs. Another reason of farmers' lack of cooperation is the lack of reliable water supply by MoE. Therefore before involving farmers in water management, the MoE needs to ensure reliable water supply in the canal systems, so that the users have enough incentives to participate in their WUAs.

IRRIGATION SYSTEMS IN THE QAZVIN PROVINCE

In Qazain province, IMTs were planned in 2002 after consultations between MoE, BoE and MoC. In Qazvin, 860 kilometers of tertiary canals were transferred in 2003, 250 kilometers of secondary canals in 2004 and 94 kilometers of main canal in 2005. In total some 158 WUAs have been formed so far in Qazvin province alone. During the WUA formation, all stakeholders were consulted in brief meetings. According to the head of Water Management Company, the groundwater forms a significant proportion (50% or more) of water resources available and used for agriculture. Though agriculture is the main water user, the surface water systems also serve municipal and environmental uses.

The WUAs are mandated to either manage surface or groundwater, and the conjunctive management is currently not a WUA responsibility. The older canal systems are in serious need of rehabilitation and maintenance. The main and secondary canals are equipped with hydraulic gates. The canals are operated only for 12 hours per day, and only in summer time (April-October). The system of water supply has been a demand based one - each farmer needing water has to submit his demand, get a pay slip either from WUA or from WMC if WUA is not operational, pay the charge in advance at the bank, and return payment receipt to canal office, which will then issue a water release slip specifying time, date, discharge and duration of water supply. This on-demand system was quite sophisticated, but had a lot of transaction costs for farmers. Both WMC and the WUAs have been operating the irrigation systems using this design approach, with one key difference of local water ordering system pursued by WUAs versus centralized order system followed by WMC.

Before the emergence of WUAs, the main issue farmers faced were related to the time and effort each farmer had to spend in traveling to submit his demand almost once every ten days during the cropping season, and paying the charges and then again providing the proof of payment for water release. Thus, the **main incentive** why farmers supported the management transfer was that many of them could reduce transaction costs by saving on the time and effort they would otherwise spend in ordering water, as through WUAs, ordering water and paying for it was to be localized. The creation of WUAs has thus enabled farmers to use a more grass-roots oriented system of locally ordering water than a cumbersome and centralized one.

The fee collection rates were low initially, but the FUWUA had taken steps and issued sanctions, and now the collection of Irrigation Service Fee (ISF) is almost 100%, which

is deposited to Ministry of Energy, which is supposed to return 25%[1] of collection to FUWUA for Operation and Maintenance costs. The key constraints include lack of start-up capital, availability of credit for maintenance, lack of coordination between MoJA, MoC and MoE, as well as within different branches of Ministry of Energy. Overall, the farmers still have complaints about WUAs regarding the quality of service and the maintenance of infrastructure. The WUAs have received quite old and dilapidated canals, some parts of which are in serious need of rehabilitation.

Rehabilitation and maintenance costs are rather high due to lined channels, as the system receives a high load of stones which require mechanized cleaning annually. These costs are high due to financial difficulties faced by the FUWUA due to non-provision of their share in the ISF. According to farmers, the reasons for delayed or non-payment of WUA share of ISF were largely due to poor coordination between various branches of MoE.

SECOND GENERATION PROBLEMS IN EARLY IMT PROGRAMS[2]

Insecure water rights were reported to be the frequent most second-generation problems affecting WUAs in Philippines, Turkey, Mexico, Colombia and Argentina. So were the financial shortfalls, lack of rehabilitation and lack of capacity amongst WUAs for effective financial and administrative management. Though most farmers have managed their water for many years at their fields, they lack knowledge and experience of managing systems. While taking on new roles of governance, they need basic knowledge across several disciplines in order to keep their hired staff accountable. Thus, there is a need for capacity-building and support services mechanism for reliable legal and technical advice. Also, there is a need for either a support service for lobbying in governmental policy forums, or apex level WUA bodies that can present and argue for WUA rights at higher policy forums.

Most WUAs have faced **financial shortfalls** for various reasons. As reported by Vermillion (1997), the WUA managements tend to charge less from their members, and adopted several corollary cost-cutting measures in order to be popular. This has resulted in ignoring necessary maintenance and repair work. Several reasons contribute to low fee setting and poor recovery; including lack of authority to set fees and apply appropriate collection measures (Pakistan); lack of metering devices to charge by volume (Tajikistan, Uzbekistan and Kyrgyzstan), where the state policy is to charge by

1- It is not clear how the shares of government and FUWUA were defined in Service Fee. The ideal principle for fixing the ISF in Iranian conditions would be to allocate all operation and maintenance costs PLUS a discounted amount of infrastructure replacement costs. The system being described here originates from a river, and thus the FUWUA should only be paying the infrastructure replacement cost to the government while keeping the balance for meeting its operation and maintenance and rehabilitation costs. It is thus proposed to conduct a detailed investigation on this to help policy makers develop a transparent ISF charging system. In addition, how the charges are to be levied and collected from farmers, should be internal FUWUA business, which is largely dependant upon its infrastructure. For example in the system visited, charges are levied volumetrically, but if the water volume upstream varies, the theoretical discharges are not guaranteed. Thus a farmer might end up paying for less or more water than planned and received. (This is not a proper volumetric system if it relies on correct operation to deliver a nominal rather than an actual volume)

2- This section is based upon the findings of Svendsen, et. al., (2000).

volume; not keeping promises on provision of subsidies from the state (Uzbekistan); and lack of conformance to agreements by state bodies; and farmers' ability to pay (Sri Lanka, Nepal, Iran, and Central Asia).

Most IMT programs tend to turnover systems that are in serious need of rehabilitation, and the IMTs are attached to the donor conditionality rather than an internally felt need. Besides, the maintenance needs of such systems are not carefully assessed and diagnosed. Some South East Asian countries like Vietnam, Indonesia, Thailand, and to an extent the Philippines, have made an industry out of rehabilitation for IMT. The Ravansar case in Iran exhibits as if Iran is also embarking on the same path.While the WUAs take over the management due to state in-efficiency, many systems are not easy to operate and maintain due to technology or seriously and continuously deferred maintenance. In many other systems, the system designs might be outdated to cater to more recent needs. Even in systems that are attached to a donor-funded maintenance and rehabilitation program, WUAs lack capacity to prepare proposals and mobilize co-financing. WUAs do not find enough incentives not to defer maintenance.

Lack of financial and administrative management expertise amongst users often becomes a major problem. While farmers do manage resources and staff individually for their farming, they have relatively less experience in doing so in an organized fashion. In many instances, the WUA management could take decisions that are contradictory to their set policies or objectives. In many WUAs, lack of will to apply sanctions has resulted into poor resource mobilization for maintenance. In addition, identifying and recruiting appropriate staff becomes a major headache in many countries like Central Asia, where irrigation system management is a rather unique expertise available to state employees only, and the experts and staff WUAs get had never worked with private organizations.

Irrigation agencies face problems of dislocation/shortfall of staff, erosion of technical capacity and need to define and assimilate the new role for the agency in the changing context. Besides, in many water scarce countries, there is a lack of will on part of the state agencies to step away from rent seeking (as explained earlier for Indian case) which can frustrate the IMT efforts.

Farmers generally face challenges of increased water fees, additional physical participation in O&M, and additional transaction costs of acquiring and using information. In addition, they have also to bear the additional burden of adjusting to the new institutions.

PROPOSED IMT FRAMEWORK FOR IRAN

Iran has already identified IMT as a policy for future water resources development and management, and is encouraging transfer of irrigation systems to local level organizations. The objectives of such efforts remain vaguely defined in terms of efficient water resources management, improved farm income and reduce government spending. Most of these objectives can not be achieved simultaneously and need compromise. The objectives might also vary for different levels of an irrigation system. Thus, there is a need to clearly set policy objectives, and define a clear strategy for how to design, implement, and monitor IMT in various river basins and agro-ecological settings to meet those objectives. An IMT strategy should clearly spell out the roles and

responsibilities of MoE, BoE, and MoC in relation to the new organizations emerging for water management, and the IMT should be piloted in a few selected canal commands and then out-scaled to larger areas. The mandate of the current collaborative committee of the three ministries can be expanded to formulate such a strategy, and make arrangements for its implementation, monitoring and periodic review.

The most recently introduced legislation on irrigation improvements might bring more investments, but could lead to greater inequality amongst water users and put the access to water by poor people in jeopardy. In addition, WUAs are currently organized under cooperative law, which applies to business cooperatives. WUAs manage a common pool resource in the public interest and thus are not strictly business cooperatives. A serious review of all applicable laws to agricultural water management, including laws related to land rights, is essential to remove inconsistencies amongst various laws. Many countries have resolved for special laws relating to IMTs that over-ride the existing laws wherever there is a conflict. This might be path for Iran to follow.

The experience of devolving management to companies in Kermanshah instead of WUAs has already proved that such arrangements are neither efficient nor sustainable. Thus, commercialization of irrigation management does not seem working in Iranian context. On the other hand, the experience in the Qazvain province of establishing tiered users organizations seems quite successful, despite several constraints faced by the WUAs. Collective action for water management has a long history in Iran, where tribes and communities have been self managing qanat systems since centuries. Thus, mobilizing farmers to form tiered WUAs with government moving its role to facilitation and regulation could lead to viable WUAs.

The organizational model of WUAs followed in Qazvin province, with some modifications might be adopted and tested out. For example, the watercourse level WUAs might be too small to be financially and technically viable. Instead, informal water user groups could be organized along quaternary and tertiary canals along the same lines as in Qazvin for preparing cropping plans and assessing water demand, as well as distributing water amongst their group members, undertaking maintenance and conflict resolution at the local level. The formal WUAs at the secondary canals level might be more suitable. The Secondary canal WUAs can then be federated at the main canals and take O&M responsibility for the entire system (See Figure 3 for Illustration). The qanat systems have complex and detailed operational rules and procedures, detailed memberships, rights, obligations and often hereditary water masters. Such systems need to be understood well before any careful intervention aimed at enhancing the operational performance.

One cautionary point relates to the clarity in land and water rights. As there are growing trends of sharecropping, absentee landlordism, and land fragmentation, it is important that the mobilization models ensure inclusion of smallholders and leaseholders in the WUA formation processes. A good practice is to allocate leadership quotas for various landholding categories, with majority to the smallholders and farmers from the tail-ends of canals.

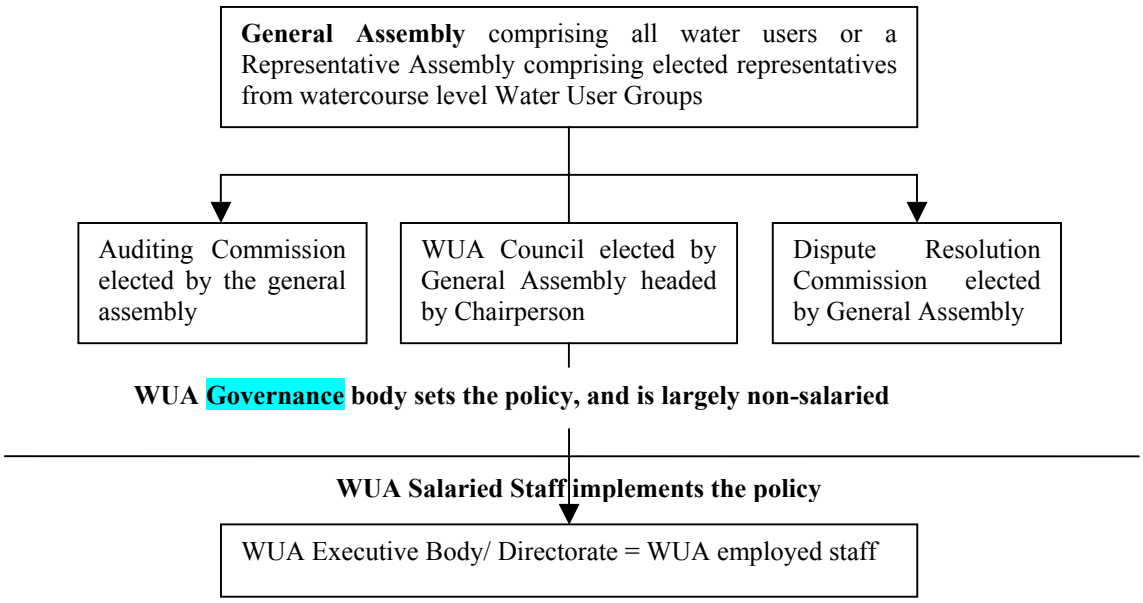

Figure 3: Organs of a Water User Association (adapted from Ul Hassan, 2004.

At the pilot sites, it appears that governance and management has been fused together. Governance bodies are farmer representatives elected out of farmers for WUA level policy formulation and implementation oversight. These positions are generally not paid salaries or commissions, but when they spend time on WUA supervision, etc. their time and other costs are then compensated through payment of daily allowance, travel costs, accommodation, etc. The management (staff) positions are fully or partially paid, but they should not have the right to represent water users. It is important to keep management and governance separate (See appendices I and II for Illustration). When they are not separate, there is a chance to induce corruption in the organization.

Setting and collecting the water charges appropriately is an important issue for Iran. Presently, water charges are set at 3% of the gross farm incomes. However, considering the differences in water resource availability and agro-ecological zoning, the infrastructure for irrigated agriculture might be more expensive in some areas than in others, due to, for example, differences in water source, irrigation technology, etc. In such situations, the present rule of thumb will make O&M financing extremely unreliable. In most countries, water for agricultural use has no price as a resource. What farmers pay is generally the cost of water delivery services, including operation, maintenance, and governance costs, and occasionally infrastructure replacement costs. The most transparent way of doing it is to establish these costs for the irrigation system managed by WUAs, and adding proportionate costs for upstream system (main canals, diversion system, etc.). The reservoir operation and maintenance costs are generally not charged to farmers, but are recovered from other sectors and uses (municipal, environmental and power). Since the water charging policy of Iran is unclear, it is proposed that such a study be commissioned as early as possible, and the water pricing policies be then adjusted based on the recommendations of the study. In addition, the fee charging mechanisms within the WUAs should be left to WUAs and not imposed

from above. The current practice of charging a fixed proportion of agricultural income as a water fee is neither transparent, nor efficient in encouraging water conservation.

The arrangement for resolving water-related conflicts between WUA members, amongst WUA members and WUAs, among WUAs and the water service provider are not clearly defined, and need to be identified. For example, the disputes within an organizational tier could be resolved internally, and in case there are disagreements, the affected party could appeal at the next higher tier. The disputes between the WUAs and the state agencies might be resolved by independent courts or arbitration commissions.

Transparency and accountability are two key pillars of participation. The situation with regard to overall water rights for FUWUA in Qazvain is not clear. Likewise, as was explained by farmers, while FUWUA is fully accountable to state (depositing ISF to state fully), the state is not accountable to FUWUA (untimely water release, non provision of ISF share of FUWUA). These issues need to be resolved through the IMT agreement to be signed by the FUWUA and the water service provider.

The ultimate objective of handing over the management of irrigation water to farmers is to introduce efficiency, discipline, and conservation for enhancing water productivity. However, as was the case in Qazvin, the pioneering WUAs are facing problems due to state agencies. While the WUAs might be able to meet the challenge in the short run, continued dis-incentives might affect negatively on their ambitions and enthusiasm. Thus, it is of paramount importance that the incentive structures and policies are set in a way that encourage water users and their associations, as well as the other water managing entities to manage it better. For example, soft loans or small matching grants for maintenance might encourage WUAs to improve maintenance, and thus reduce conveyance losses. Similar loans for water application technology might help water users to reduce consumption.

CONCLUSIONS

Implementation of IMT in Iran is relatively new. Therefore, there is a clear need for institutionalized arrangements for social mobilization and capacity-building, as well as strategies to achieve higher awareness and participation in both organizational development as well as organizational action. A social mobilization and capacity building action program might be needed. In the capacity-building programs, it needs to be ensured that the capacity building efforts take care of needs of the future organizational leaders as well as the current leaders. While MoC has the mandate to organize agricultural cooperatives, water management is a much more specialized task. The BoE and MoC should pool their resources and come up with a WUA mobilization and capacity-building strategy and a pool of WUA mobilizers and trainers. This pool can latter provide backstopping and support services to WUAs. A more rigorous and well structured social mobilization approach would help speed up organizational building. Such an approach comprises of identifying and deputing Social Mobilizers from provincial extension staff, training them in social mobilization and capacity-building of WUAs, and then starting the social mobilization process simultaneously at several locations. The mobilization process needs to be carefully designed and implemented with a rigorous and robust monitoring component to regularly advise on the needed changes in content, design and strategies.

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APPENDIX I: Proposed Governance and Management Functions in an Iranian WUA:

WUA Governance	WUA Management
1. Approval of WUA status and by-laws 2. Approval of membership and new members 3. Election and appointment of executive bodies including leaders 4. Approval of rules and fees for water services 5.Approval of plan for water distribution and its control 6. Approval of budget 7. Addressing WUA development questions 8. Monitor the performance of WUA management by selecting performance and service delivery standards 9. Approval of audit 10. Dispute resolution	1. Preparation and finalizing of seasonal water requirement and distribution plan 2. Fair water provision to all water users 3. O&M of infrastructure 4. Environmental Protection Plans 5. Organization of water accounting 6. Data collection and database management 7. Assisting WUA to improve financial potential 8. Organization of financial and audits 9. Assistance to farmers to increase water productivity and conservation

Source: Adapted from Ul-Hassan, 2004.

The day to day functions of a WUA include:

a) Distribution of water, according to agreed schedule and prevailing water rights/allocation

b) Operation of hydraulic infrastructure – head gate, regulating structures and farm turnouts (unless the farmer does this)

c) resolution of disputes over distribution and allocation

d) setting and agreeing the level of water fees

e) assessment and collection of fees

f) Book keeping for costs and income to the WUA and presentation of accounts in public meetings, at least once per year; record keeping and keeping of a bank account.

g) Optionally, the provision of input and marketing services for specified items.

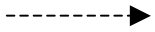
h) Organization and payment for maintenance of channels, structures, and public access (roads, bridges, tracks etc); ditto for any costs involving pumping, fuel, etc

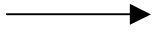
i) Organization and payment for up-grading (modernization or improvement) of the system, to better meet farmers' operational needs.

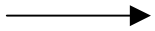
j) Monitoring of canal and drain flows, rainfall and groundwater use.

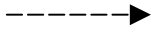
APPENDIX II: A Schematic Diagram of Hydraulic Infrastructure and Proposed Management Organization

Hydraulic Level	**Organization**	**Key Functions**
River Basin	Basin Authority ``	Make basin policy & regulations, collect and process hydro-meteorological information, prepare sectoral water allocation, conservation, asset management & development, & financial plans, make inter-organizational agreements, regulate FWUAs, settle disputes amongst FWUAs
Primary/ Main Canal	Federation of WUAs	Collect, provide & analyze water supply data to support transparent management, prepare & implement water allocation, conservation, drainage, asset management & development, & financial plans, manage surface and groundwater conjunctively, regulate WUAs, settle disputes
Distributory Canals	Water User Association	Collect, & analyze water supply data, prepare & implement water allocation, delivery, conservation, drainage, asset management & development, & financial plans, settle disputes amongst WUGs, apply sanctions on offenders, Assesss and collect water fees
Watercourse Canals	(informal) Water User Groups:	Distribute water, assess and implement maintenance, resolve disputes within members, report offenders, apply sanctions


= *Regulation/coordination*


= *Provision of services*


= *Negotiation & agreements*


= *Payment for services*