POTENTIALS AND OBSTACLES ON IRRIGATION MANAGEMENT TRANSFER (A CASE STUDY OF FOUR IRRIGATION NETWORKS IN IRAN)

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ABSTRACT

Different studies have been shown that despite relative success in improving irrigation performance, none of these activities were successful in their goals and still there is "performance deficit" in irrigation networks. Studies indicated that the performance deficit is due to an imbalance between the roles of government agencies and irrigators in all levels of irrigation development including design, operation and maintenance, planning and decision making.

Irrigation management transfer (IMT) and turnover of the management and authority of public irrigation networks from government to water users associations or other entities is the major trend which is occurring in the context of irrigation management in most of the countries including I.R. of Iran.

The objective of this study was to evaluate the current situation of the four irrigation networks of Iran from view-points of the share of government and water users in decision making and irrigation management. The study dealt with the potentials and obstacles for IMT and view-points of the government and water user entities in this regard. Some marginal information regarding the role of existing institution or future established association on water management and water productivity, and farmers' responses to water scarcity during drought was also obtained.

A comprehensive questionnaire was prepared. The questions referred different target groups including farmers, water users, government staff, and the networks managers. The designed questions attempted to receive the motivation and limitations on IMT and view points of the water users and network staffs on water management issues, and their desire expectation from the changes and their anticipation form the future.

The selected networks were Droodzan, Esfahan, Dez, and Ghazvin irrigation projects. In the selection it was tried the selected networks to have all the parameters and factors regarding water management and allocation issues.

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Based on results the potentials and tendency for IMT varies in the different irrigation networks. There is motivation for IMT potentially, but in most cases there are serious hindering factors or obstacles that affected this motivation, among them we can nominate lack of enough mutual confidence between farmers and the network management, lack of enough and or proper laws and regulations, organizations and institutional arrangements, support, and follow ups.

In most case the main motivation for IMT from farmers is equity in water allocation. However, the motivation from networks management (local government) is not clear or well defined and general objectives are stated for the motivation.

The necessity for rehabilitation and renewal of the system prior to implementation of IMT is mentioned in all cases as important condition for the successful implementation of the program.

In this paper the view points of the farmers and the government entities regarding IMT process is provided and the potentials and obstacles for this process is provided and discussed.

INTRODUCTION

By the definition "Irrigation Management Transfer" (IMT) is the turnover of responsibility and authority for irrigation management from the government to farmer groups or other non- governmental entities. It generally involves the contraction of the role of the state and the expansion of the role of private sector in irrigation management (Abernethy, 1997).

IMT is becoming a general policy for the management of irrigation sector in most countries, especially in developing countries recently. Indeed this process is not so recent. It started in some countries, e.g., USA, France, Colombia, and Taiwan, many years ago, (Vermillion, 1997). In Asia, the Philippines is one of the earlier developing countries to begin the process of management transfer.

IMT can be considered as consequences of certain global trends, which include market economics, privatization, decentralization of authority from central government, and empowerment of local communities in irrigation sector.

After the construction era and followed by reduction in construction of new irrigation projects, one resulting implication was that for sustaining current rate of growth in agricultural outputs, the hydrologic and agricultural performance of existing irrigation systems must improve (Svendsen, 1993). So a performance-oriented concern came into effect in Government officials attitudes. The activities such as on-farm development, rehabilitation and modernization of irrigation projects, and training programs of the staff are some examples of those efforts. However, the studies have been shown that despite relative success in improving irrigation performance, none of these activities were really successful in their goals and still there is "performance deficit" in the irrigation systems.

Many studies in the 1970's and early 1980's indicated that the performance deficit in newly constructed irrigation systems was due to an imbalance between the roles of government agencies and irrigators in all levels of irrigation development including

design, operation and maintenance, and planning and decision making. This fact leads to initiation of IMT process.

IMT and most of the changes that are proceeding now, mostly originates from governments. Because of shortage of financial resources, governments have found that it is difficult to manage and operate irrigation systems based on the old modes of public organizations management especially following rapid expansion of irrigated areas.

There are some evidences (Vermillion, 1997) which IMT programs have not been completely successful in implementation phase or had negative impacts both on governments or farmers after turnover process. As Vermillion, 1995 (Meinzen-Dick, 1997) stated, management transfer programs which do not ensure that necessary conditions for effective management are met, will create "false or failures". The results should be that after a few years system will deteriorate and state agencies will seek to take over management once more (Meinzen-Dick, 1997). Therefore, IMT programs need some implications, policies, conditions, processes, and enabling environment.

These programs also can be implemented in various levels. Levels of disengagement programs vary by the country and local conditions

IMT or transfer of irrigation systems management is the most apparent trend which is occurring in the world, especially in the developing countries. This process has also started in Iran some years ago and is accelerated recently.

The main objective of this research was to study the process of IMT in the irrigation networks of Iran. The specific objectives were:

- To study the potentials, incentives, and motivations for the IMT both among water users and government officials in the selected irrigation networks.
- To study the limitations, problems, and obstacles for the IMT in the selected irrigation networks.
- Overall evaluation and perception from IMT and other issues of water management relevant to the selected networks.

MATERIALS AND METHODS

Four irrigation networks were selected for the purpose of the research. The selected irrigation networks were: Droodzan, Esfahan, Dez, and Ghazvin irrigation projects located in the Fars, Esfahan, Khuzestan, and Ghazvin provinces respectively.

The criteria for selection of the irrigation networks were all the networks to be typical and have all the problems relevant to water management and irrigation performance, O&M, and water limitations and scarcity.

It was attempted to review all the literature and information of the selected networks to make a familiarity with the problems relevant to the water management and irrigation network operation and performance.

A comprehensive questionnaire was prepared and filled through interview with the farmers, water users; irrigation networks expert staffs and the networks management authorities.

In the followings the specification of the selected irrigation networks and the basic contents of research questionnaire are provided and explained.

SPECIFICATIONS OF THE IRRIGATION NETWORKS

Droodzan irrigation network

The Droodzan irrigation network (DZIN) is located in the Marvdasht region in Fars province (Fig. 1). The DZIN is located in between 45^{o} 51′ to 53^{o} 26′ E longitude and 20 ^{o} 29′ to 30 ^{o} 14′ N latitude. The gross and net cropping areas of the networks are 65460 and 55640 ha respectively.

The cropping pattern in the network includes Wheat, Barely, Millet, Canola, Paddy, Maize, and summer crops (melons, tomato, etc.).

The source of water is Droodzan reservoir on Kour River with a capacity of 993 MCM. In the network there are totally 150 Km main canals, 44 Km secondary canals, and 517 Km tertiary and quaternary canals (Fig. 2).

Figure 1. Location of DZIN

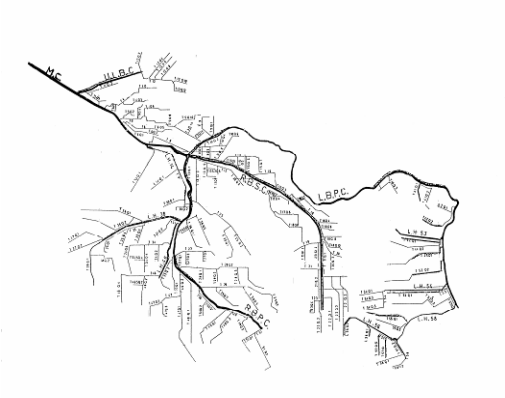

Figure 2. The canal network of DZIN

Esfahan irrigation network

The main source of irrigation water for the Esfahan Irrigation Network (EIN) is the Zayandeh Rud (ZR) river. The ZR river has been the lifeblood of Central Iran for centuries, focused around the ancient city of Esfahan. The Zayandeh-Rud Basin (ZRB) is experiencing the water stress. It has been the situation for the past 50 years. Expansion of the irrigated area through major investments in modern irrigation systems, the establishment of large scale industries which require significant volumes of water and the continuing rapid growth of Esfahan city has all depended on the fragile water resources of the ZRB.

Since 1950 strategies have been taken to increase natural water potentials, both through trans-basin diversions and reservoir construction. But by 2000 it was clear that demand has continued to grow faster than the possible water resources development. As a result there is increased pressure on both water and soil resources. Tail end areas show the

greatest stress with reduced water availability, deteriorating ground water quality, increased soil salinity and declining agricultural production and little water reaches the environmentally valuable Gavkhouni swamp (Fig. 3) at the tail end of the ZR river (Salemi et al., 2000). In Fig. 3 the location of ZRB and EIN irrigation networks are provided. All new systems have conjunctive use of surface water and groundwater.

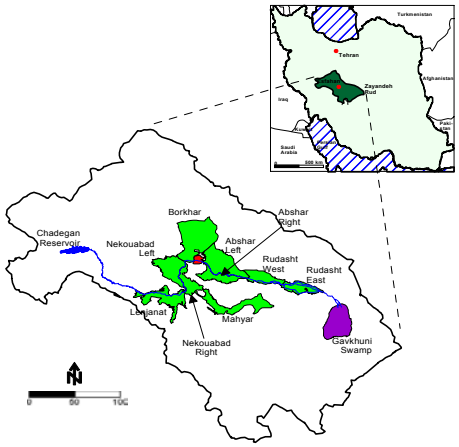

Figure 3. Zayandeh Rud basin and location of the Esfahan irrigation networks

Modern surface irrigation started with the construction of Chadegan reservoir and major diversion weirs at Nekouabad and Abshar in 1970 (Fig. 3). These four systems have provided the bulk of irrigated agriculture for the past 30 years. However, one large-scale traditional gravity system still survives, at Rudasht, the most downstream of the irrigation diversions. In the past few years there has been a large increase in the gravity irrigation network. Two large systems have been constructed at Mahyar and Borkhar, while the Rudasht network has been modernized and a new weir constructed.

Modern irrigation, either in the form of large-scale gravity irrigation systems fed by large regulating weirs or electric or diesel-powered Tubewells, accounts for almost all 90,000 ha irrigated area in the EIN. Traditional canals have been absorbed into the large-scale systems, while many Qanats have either fallen into disrepair or have been dried up by adjacent drilling of deep boreholes.

Typically there is a two-season cropping pattern in all of the irrigation systems in the Zayandeh Rud basin. Summer crops include potatoes, rice, onion, and vegetables while winter crops are dominated by wheat, barley, and sugar beet. In addition there are some annual and perennial crops, including alfalfa, orchards.

The irrigation season commences on 1 April in all years, and Chadegan reservoir releases remain more or less constant in May, June, July and August.

Dez irrigation network

The Dez basin is located between 48° 10′ to 50° 21′ E longitude and 31 ° 34′ to 34 ° 04′ N latitude in Khuzestan province in the south of Iran (Fig. 4). The total area of the basin is 21720 Km^2. The main source of water for the Dez Irrigation Network (DIN) is the Dez river. The river originates from Zagrous ranges and is regulated by the Dez Reservoir and the Dezful regulating dam. The river joins to the Karoon River and finally flows to the Persian Gulf the outlet of the basin.

Currently around 17000 farmers and four Agro-Industries are involved in the agricultural activities in the DIN.

There is plenty of water in the region and the quality of water and soil for agricultural uses is suitable. The climate of the region is temperate to warm and all agricultural crops except the crops specific for cold regions can be cultivated. The common cultivated crops in the networks are: Wheat, Barely, Maize, Pulses, Alfalfa, Sugar beet, Citrus, and Sugarcane.

The design consultant company of the DIN had proposed a cropping pattern for the 50 years life of the network (1966-2016). However there are regular fluctuations in the cropping pattern in the past years. The initial proposed cropping pattern were mostly based on production of forage crops while because of government policies, crop prices, and lack of use of proper machinery it deviate from the original and it can be said that the initial cropping pattern never executed.

Ghazvin irrigation network

Ghazvin Irrigation Network (GIN) is located in the Ghazvin province almost 100 Km west of the Capital (Tehran) (Fig. 5). The source of irrigation water is the Taleghan river, originated from the Alborz ranges in the North. The area of river basin is 748 Km^2. The average discharge of the river is around 420 MCM per year of which about 280 MCM is used in the GIN.

The common cultivated crops in the GIN are Wheat, Barely, Canola, Sugar beet, Pulses, Potato, Tomato, Maize, Alfalfa, and Orchards (Grape and Apple). The total cultivated area is 60,000 ha and the total fallow land area is 15000 ha per year.

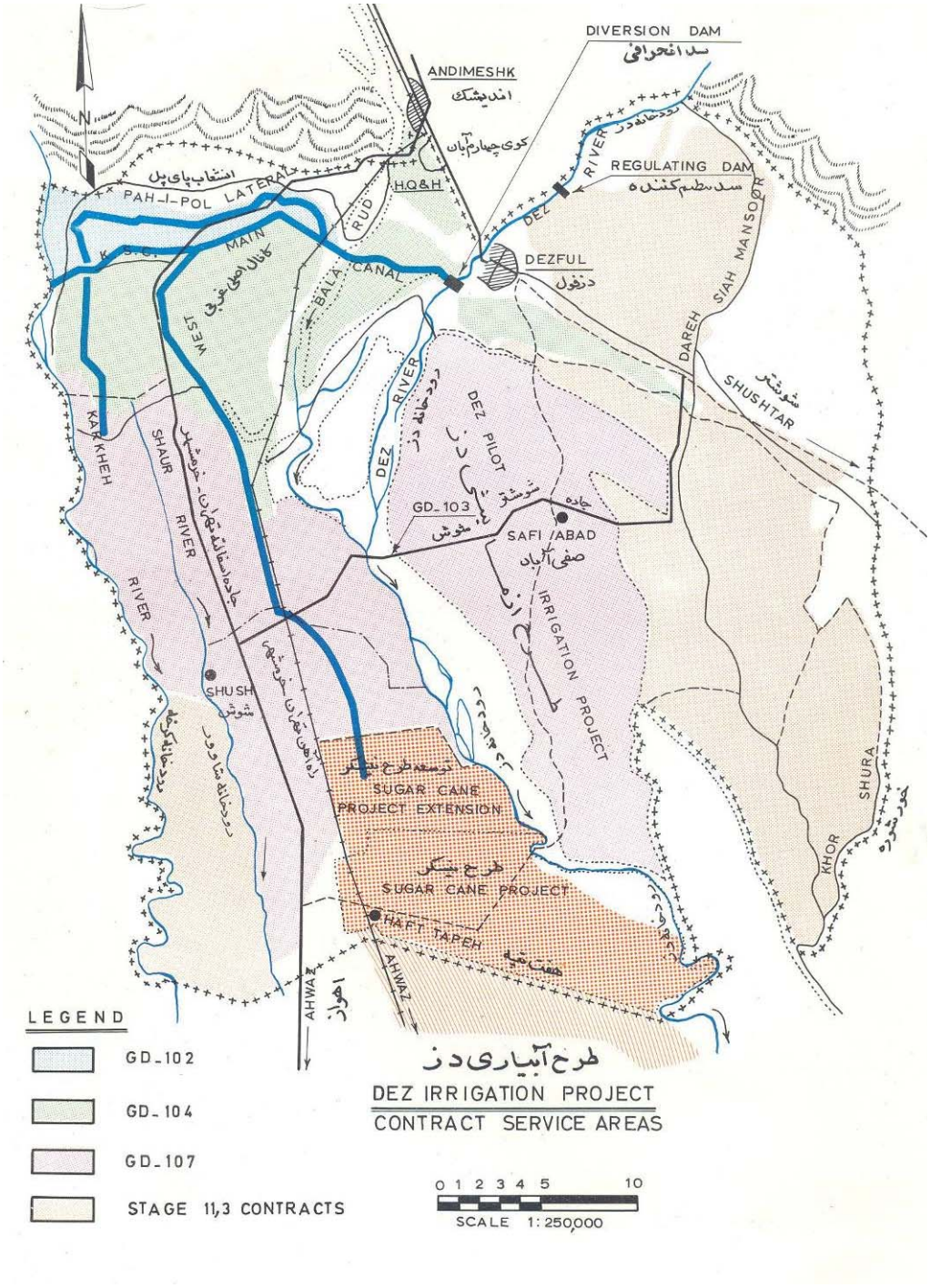

Figure 4. The Dez irrigation network

Water resources availability has been one of the major hindering factors on the economical development of the Ghazvin Plain. Following the earthquake disaster in the region in 1962 and the unique location of the region, considering the closeness to Tehran and to the transit roads to the west and north of Iran, this region was paid more attention for the development. One of the outcomes was study of 422000 of lands and crop production in these lands using regulated surface and groundwater resources. Ghazvin Development Project (GZDP) started at 1967. It comprises different water

development projects which are conducted during the last three decades and it is still being completed. Following complete implementation of the GZDP the irrigated area in the Ghazvin plain will be around 220,000 ha. Currently there are 30,000 farmers in the network.

The Research Questionnaire

The questionnaire includes three types of questions including general questions, questions regarding the irrigation network, and specific questions (from the farmers and the networks staff and officials) on participation of water users and irrigation management transfer. In overall, the designed questions attempted to receive the motivation and limitations on IMT and view points of the water users and network staffs on water management issues, and their desire expectation from the changes and their anticipation form the future.

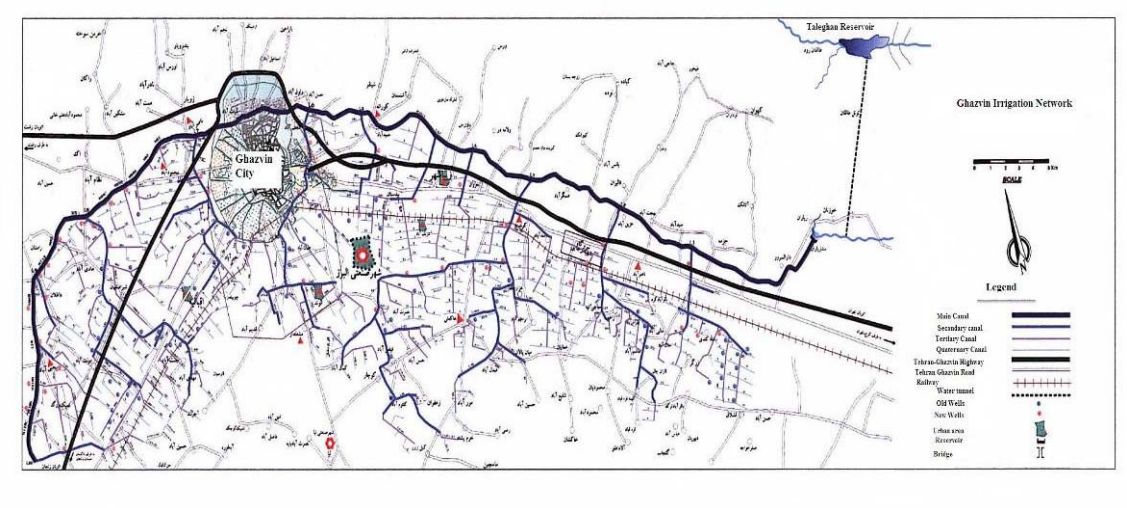

Figure 5. The Ghazvin irrigation network

Regarding IMT, the following set of conceptual questions included in the questionnaire:

- Current problems and inefficiencies in the irrigation network
- Levels of satisfaction of users from current condition of the irrigation network and the sustainability of irrigated agriculture
- Motivation, potentials, and hindering factors among water users and the irrigation network management team and staff on devolution of authorities and IMT
- Desired levels of disengagement and IMT
- Required conditions and enabling environment for IMT
- The expectations from IMT regarding improvement of water allocation and equity
- Rehabilitation of the network prior to IMT and Government support following IMT program

- Water users participation during drought and water scarcity conditions
- The water users anticipation, expectations and predictions for the future of agriculture and water management in the irrigation network

RESULTS AND DISCUSSIONS

In the following, the results of questionnaire on IMT issue of the selected irrigation projects are provided. The results are summary of answers to the direct and indirect questions set in the research questionnaire for evaluation and understanding of the current situation of the irrigation projects, their water management problems, and the motivations and limitations on IMT process in these networks.

Droodzan irrigation network

The history of agricultural and irrigation activities in the Droodzan region goes to ancient times of Achaemenian dynasty. The DZIN was completed in 1972. Its command area was 42000 ha and laterp it increased to 56000 ha. It is operated by the water board authorities of the Fars Province.

Based on the government policies and approval of the farmers, the crop type and cropping areas are determined, and water deliveries to the farmers are based on individual contracts. There is a continuous flow of water in the network and the water masters deliver water to the farmers at the downstream of tertiary canals.

One of the main limitations of the agricultural production in the DZIN is water logging. There are totally 700 Km drainage canals in the networks that need proper planning, operation and maintenance. There is no accurate and controlled supervision on water intakes from the gates.

Little on-farm development activities has been done in the network and little training and capacity buildings activities has been done both for network staffs and the farmers.

The overall irrigation efficiency of the network is estimated to be 44%. In the network, the farmers use groundwater in water scarcity and drought condition for supplemental irrigation to save their production. The water price is 3% of the total crop production in terms of monetary. However, the water pricing policy had little effect on water savings in this network.

In overall, the network is facing with different problems, affecting its performance. These problems include shortage of specialized human resources for new irrigation and water management methods, financial inefficiencies, shortage of O&M activities, inequity on water allocation and crops yield losses during drought years and water scarcity, lack of proper water measuring devices, and socio-cultural problems of the water users and social stresses during dry years in the network.

During water scarcity and drought years cultivated crops are reduced and water rationalization policies are imposed. In this situation social stresses and conflicts and water violations are increased. Based on network staffs perceptions, in this condition there is not much cooperation between farmers and the system and even among farmers themselves. This is partly due to the mismanagement of the network.

At the present condition, there is not much motivation for IMT especially from the farmer side. It is mainly due to lack of enough confidence and reliability of the farmers to the network management. The farmers believe the IMT but need more support from the government. Their main wish and willingness from these programs is improvement in the equity of water delivery.

The motivation for the levels of IMT is mainly to the management of the tertiary and quaternary canals. However, the farmers are also willing to have supervision on the management of secondary and main canals through their representatives.

Based on questionnaire, the conditions and enabling environment for IMT in this network is mutual confidence, cost recovery of IMT to the farmers, training and capacity buildings of the farmers and management team of the network, rehabilitation and renewal of the system prior to IMT.

It is also stated that the IMT programs need consistency. A number of Water Users Associations (WUAs) have been created but has left following management change of the network. This has led to reduction of farmer's confidence and trust in the system. Based on the irrigation network officials, currently there are 190 WUAs officially, but based on farmer's perception only three of them are active. The irrigation network management is not much satisfied with the function of these associations.

This network needs more socio-cultural activities and improvement of participatory work. They believe that current levels of water management are not sustainable and its continuation will make damages to the farmers and the system.

Esfahan Irrigation Network

In general, the primary threats to sustainable irrigated agriculture in this network are: reductions in water for agriculture because of competition from other sectors, declining water quality in both groundwater and surface water resources, and soil salinization. There other problems and limitations associated with this network are: the low knowledge levels of the farmers, lack of training on water management, extra losses in the earthen canals and damages to the lined canals, fluctuations in water discharges, and inequity in water allocation. From farmer's perception, water shortage caused by improper delivery and extra losses from the earthen canals are the main source of low irrigation efficiency. However, research studies (Akbari, et al., 2004) indicate the water productivity in the irrigation networks is relatively high and in average is around 1.4 Kg/m^3. This is mainly because of the deficit irrigation that the farmers generally practice.

The farmers use groundwater for supplemental irrigation during water shortage in critical crop stage or whenever they fill there are threats to crop yield due to water.

In the case of water scarcity or drought in the network, the farmers reduce the cultivated area and apply some innovations for more water saving. The water scarcity condition also causes some disturbance in farmers communities and creates some conflicts with the network management team.

The farmers are willing for IMT and the ground is ready, but it needs government support and capacity building. Most of the farmers believe that with IMT the equity in water allocation will improve and their crop yields will increased.

They stated that rehabilitation and renewal of the irrigation network is one of the primary conditions for IMT implementation. They also want their involvement and participation in the process of IMT to be more legalized and documented.

Their request for improvements in the system are on-farm development activities (canal lining, pressurized irrigation, etc.), and trainings on irrigation and water management.

They believe that the future of irrigation and sustainability of water management in this network depends on behavior and support of government. There are some doubts and some hopes to this future.

Dez Irrigation Network

Of the major problems of the DIN, is the low irrigation efficiency (around 31%). Some reasons for the low irrigation efficiency are lack of completion of the tertiary and quaternary canals in parallel to the main and secondary canals, small farms sizes, plenty of water and irrigation in the day times only, and lack of proper training and capacity building on new methods of irrigation management.

Water price for the agro-industries available in this network is volumetric basis. It is about 2% of Rials/m^3 (0.0002 US Cent/m^3). The water price for the other farmers and the orchards depends on crop type and is based on cultivated area. For example the water price for Wheat and Tomato are 262000 Rials/ha (28 US$/ha) and 887000 Rials /ha (96 USS$/ha) respectively. Water pricing is not based on farmers view points and due to lack of volumetric allocation, water pricing has not much effect on water savings.

History of farmer's participation in water allocation in the Dez area returns to ancient times. Prior to construction of DIN the farmers diverted the Dez river to their land through digging of six Qanats and 14 irrigation canals. Currently there are 29 agricultural cooperatives of which 21 cooperatives are active.

The Water Company (under Water Deputy of Ministry of Energy) is not willing to manage tertiary canals, and supposes it is duty of the Agrultural Organization (Ministry of Jihad-e Agriculture). Therefore, currently there is no efficient management of tertiary and quaternary networks from the company side. This company just handles the affairs relevant to the secondary and main canals in the DIN.

IMT is not a seriously followed process in this network even in the levels of the tertiary and quaternary canals. Based on DIN management staff there are different obstacles in IMT in this work among them the following are the most important:

- Distribution of agricultural lands to small sizes
- Low interest among farmers to participatory work and lack of enough cooperation in water rationalization
- Lack of implementation of the proposed cropping pattern by the network consultant engineers

- Lack of required coordination among the authorized organizations for the management of land (Ministry of Jihad-e Agriculture) and water (Ministry of Energy) and lack of execution of establishment of WUAs acts and bylaws
- No clarity on the ownership of lands in some parts of the network
- Lack of enough confidence to proposed plans by the responsible authorities in the networks and their negative background on the former establishment of cooperative programs
- Lack of programs and plans on justification, concepts, clarity on the concept and objectives of IMT, and the roles of WUA for the farmers

It is suggested that for the initiation of the IMT programs firstly they start in the small scale and pilot levels, e.g., turnover of the small size pumping stations or the command area under some gates in the different parts of the network.

In overall, the irrigation network management staff recommend that IMT in the DIN to be in the levels of tertiary and quaternary canals.

Overall, the following conditions have been proposed for a successful IMT in this irrigation network:

- Participation of the farmers in all stages of design, execution, operation, and maintenance
- IMT firstly be implemented in the pilot level
- The DIN be managed through a steering council and the representatives of the farmers be members of this council
- IMT be implemented in different stages
- Clarity in the roles, laws, and responsibilities and authorities
- Execution of training and capacity buildings programs for the farmers and the network staff in order to increase their culture of responsibility and participation
- Rehabilitation and renewal of the system prior to IMT.

Ghazvin Irrigation Network

The problems associated with the water management in the GIN are: The general problems and in efficiencies during more than 30 years implementation of the GZDP, lack of proper O&M activities and early deterioration of irrigation facilities, illegal water intakes, increase in illegal well drillings and expansion of the legal wells water withdrawn capacity leading to over exploitation of ground waters, and the risk and security problems both for the network and human health due to expansion of settlement and communities into the irrigation networks areas.

There is increasing demand and competition for water resources due to expansion of urban and industrial sectors. This competition also exists within agricultural sector in the network and in the region due to increase in income and economical profitability of agricultural activities in the region.

During water scarcity and drought, the pressure on groundwater resources increases and most of the farmers request for getting license for drilling of new wells in their lands. In this situation the network management just forces on reduction of the cultivated area and there are no other implications and risk management.

The main motivation for IMT among farmers is equity in water distribution. They are also interested in the program to be in low levels and then implemented in higher levels if they receive government support.

For successful implementation of IMT they believe to the following pre-conditions:

- Rehabilitation and renewal of the network (as the first priority)
- Reliable supply of water
- Confidence and reliance of the farmer to the program
- Support from relevant government organizations e.g., Jihad-e Agriculture, Water organizations, and Military services for conflict resolution
- Training and cultural capacity buildings

However, the farmers are optimistic to future and agricultural sustainability and profitability in the region.

The GIN is one of the pioneer irrigation networks in IMT programs in Iran. The program has been implemented in this network from 2002. The main objective of the program is conservation of the system and its optimum operation. This plan started using the local and regional capacities and implemented in three phases during three years. At the end of year 2005, the final phase of program was completed and the administrative, financial, and operational authorities of the system were devolved to the WUAs.

The following functions are conducted by the representatives of the WUAs without involvement of Government:

- Record, distribution, and allocation of water to the users;
- Canal sediment function, maintenance, and rehabilitation of the networks facilities and structures;
- Volumetric allocation of water to the managers of the WUAs in the main canals intakes;
- Replacement of the frequent and repeated references of 3000 farmers in the network with only 10 responsible persons from the established WUAs

Deficiencies and weak points of the IMT in the GIN are mentioned as the following:

- Uncertainties in water supply;
- Lack of enough social studies for determination of proper structure of operation of the system with the participation of water users;
- Deficiencies in laws and regulations;

- Deterioration and break of the network and inefficiencies in water allocation and distribution;
- Insufficient comprehensive training and capacity building programs for water users;
- Lack of installation of proper water measuring instruments for volumetric allocation of water in the tertiary and quaternary networks;
- Lack of government support from the established WUAs;
- No clarity in financial processes and the method of dealing with the revenues and costs;
- Ambiguities in administrative structural relation of the WUAs with governmental organizations.

SUMMARY AND CONCLUSIONS

Recent trends that are occurring in the context of irrigation system' management, mostly are consequences of trends of governments global appeal in implementation of disengagement and privatization programs such as market economy and devolution of authority from central government to the state level.

Irrigation management transfer or devolution of irrigation system management to the farmers groups or other entities is the most apparent trend which is occurring in the world, especially in developing countries, following reduction in constructive policies of the governments.

Levels of disengagement programs vary by the country and local conditions. But in general it is mostly related to the economic levels of the countries and their socio-economic growth.

Transfer programs need some preconditions and enabling environment to be successful and to have positive impacts on irrigation system performance and to make irrigation agency financially autonomous. Among these, government subsidies policies, public agency staff jobs security after turnover of management, consideration of existing institutions, and farmer's participation in all aspects of design, rehabilitation and renewal of the system, should receive more attention. The turnover process should be implemented gradually, and it will be more successful if system rehabilitation could be done prior to its implementation.

The IMT process also has started in Iran as consequence of global trends and national needs and necessities. This research attempted to survey and study the motivations and incentives for implementation of such programs among both farmers and government officials. It was also tried to receive the viewpoints on existing situation, problems and obstacles, and comments for improvements and successful implementation of this program in four selected irrigation networks of Iran namely Droodzan, Esfahan, Dez, Ghazvin irrigation networks, denoted as DZIN, EIN, DIN, and GIN respectfully.

In the DZIN it can be concluded that equity and reliable water supply, especially during water scarcity and drought, are major concerns and motivation for IMT. There are not much confidence and reliability to the system management. Therefore, the ground for

IMT is not much ready. However, both the farmers and network management believe that if such programs are implemented it should be only limited to the tertiary and quaternary levels. The farmers also need support of government for the IMT and for improving their knowledge and awareness through implementation of training and capacity building programs.

In the EIN the motivation for IMT is higher. However the farmers request is the turnover of authorities and responsibilities to be more legalized and documented. They also request for more support from government and rehabilitation and renewal of the system prior to IMT implementation. There are some doubts and worries about future of irrigation and sustainability of agriculture in the region and believe that the government can play a key role on preserving agricultural sustainability.

In the DIN there are not much support or serious actions for IMT. The farmers are not much oriented or aware of the IMT objectives and have not much clear or positive background for such programs due to their bad background on establishment of agricultural cooperatives. However the farmers and government officials believe that the IMT should be implemented in low levels. It should be started gradually and in the first step in pilot scale. The deterioration of the network and lack of enough financial resources for its renewal is also a source of low incentive for IMT in this network.

In the GIN, the IMT has implemented partially. The results are somehow positive. However, there are inefficiencies including uncertainties in water supply, gaps in laws and roles, no establishment of organizational structure and linkage with the governmental organizations.

From the results of the four studied irrigation networks, it can be concluded that there is motivation for IMT potentially, but in most cases there are serious hindering factors or obstacles that affected this motivation among them we can nominate lack of enough mutual confidence between farmers and the network management, lack of enough and or proper laws and regulations, organizations and institutional arrangements, support, and follow-ups. In most cases, the main motivation for IMT from farmers is equity in water allocation. However, the motivation from networks management (local government) is not clear or well defined and general objectives are stated for the motivation.

The necessity for rehabilitation and renewal of the system prior to the implementation of IMT is mentioned in all cases as important condition for the successful implementation of the program.

Support of government and creation of proper linkages with the turnover systems are also mentioned as requirements.

In most of the networks there is no coordinated or risk management for facing with the conditions during water scarcity and drought.

There is also a general request and need on training and capacity building for the users and management team of the networks on empowerment of participatory activities and understanding the concept and objectives of IMT.

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