



GHAZVIN IRRIGATION SYSTEM CONSTRAINS & DIFFICULTIES – PRACTICAL SOLUTIONS

Ebrahim Kahrizi¹, Mirkazem Razavi²

ABSTRACT

As a result of carrying out the Ghazvin Development Project (GDP), aiming Agricultural and Rural development in an area of 80,000 ha. in a period of three decades (1960, 1970 and 1980), Ghazvin irrigation system consisting of 1053km (including the main, secondary, tertiary, quaternary canals and the pertinent structures) have been constructed and operated. Since 1993, the management, operation and maintenance (O & M) responsibilities of the above system have been assigned to the "Ghazvin Irrigation System Operation Company" (GISOC). Now a region in a nearly 60,000 ha net area with nearly 30,000 water users and an annually 630 mm³ irrigation water is under the service of the Ghazvin Irrigation System (GIS).

The public and semi-public managements over the system in a period of nearly three decades, have caused unexpected difficulties, deficiencies and constrains in the system.

Recently the Ministry of Energy (MOE) planned to study the rehabilitation of the system and its relevant management, which was assigned to Pandam Consulting Engineers.

Based on the above mentioned study and findings, advices and solutions have been proposed for rehabilitation of the system and improvement of the irrigation management, and irrigation management transfer (IMT) to water users' organizations as well and settle the participatory irrigation management based on the proposed solutions.

Key words: Farmer-participation, participatory Rural Appraisal, Rehabilitation, Irrigation Management Transfer, Water Users' Associations, Rural Development, Agricultural Development, Stakeholders.

1- Project Manager and Senior Engineer in Water Resources Management Pandam Consulting Engs.

2- Senior Engineer in Water Resources Management Pandam Consulting Engs. and Member of Iranian National Committee on Irrigation and Drainage (IRNCID).

INTRODUCTION

Rural and agricultural development are indication of economical development in every country. Achievement of such development requires in addition to other necessary conditions and facilities, is to supply and distribute sustainable water which should conform the needed water of plants in one hand, and the effective and informed participation of farmers in the process of decision making, planning, compiling of projects and carrying out thereof, the management, operation, maintenance and monitoring and evaluation of concerned activities as well, on the other hand.

GDP aiming the following activities was carried out following the destructions and damages of 1962 earthquake:

- Integrated agricultural development in Ghazvin area, based on local water resources development and conveyance of Taleghan river's water to the Ghazvin area as a complementary irrigation water;
- As a practical pattern, examining the outcomes and findings derived from execution of the project in the other areas of Iran;
- Training experts in land and water development for the development of the other areas of Iran;
- Increasing the efficiency of the crops and promoting the living standards of the farmers in Ghazvin area, supplying the food shortages of Tehran metropolitan as well.

Although the construction of the dams and irrigation system and water conveyance to the Ghazvin area have brought about the growing up in agricultural products and relative increase in the farmers' welfare, but the expected sustainable development aimed in the GDP has not been achieved, and at the present time, the Ghazvin Irrigation System (GIS) confronts the physical and management problems.

This article examines the causes of incomplete achievement of expected aims, the main reasons thereof, and also the workable and practical solutions for improvement based on the findings of recent overall studies, will be discussed.

LOCATION

The Ghazvin area locates in 150 km west of metropolitan city of Tehran, as the Tehran-Tabriz express way and railroad cross the area, it has given the area a particular situation.

IRRIGATION MANAGEMENT IN GHAZVIN AREA

BACKGROUND

Prior to performing the GDP, the irrigation management was governed by Land and Tenant (Feudal) System, where the irrigation management (IM) had being organized and supervised by the landlords and their agents and it was beyond of farmers' (tenants') authority. The main agricultural production means (land, water, seeds and tools) belonged to landlords as well. Following the enforcement of the Land Reform Act in 1963, all those mentioned agricultural means were transferred to the farmers, and along

with (thanks to) carrying out the GDP, the landlords (feudal) were substituted by the government (public section), and then verified as a completely public agency. In order to make the GDP executional, based on findings and planned aims, two organizations were established:

Ghazvin Area Reclamation Organization (GARO) in charge of agricultural development and Ghazvin Area Irrigation Project (GAIP) as responsible for supplying, conveyance and distribution of needed water and also construction of irrigation system and related structures. The main components of the GAIP are as follows:

- Taleghan dam
- Sangban diversion dam
- Taleghan water conveyance tunnel
- Ziaran diversion dam
- Irrigation system
- Deep wells for ground water exploitation
- Artificial recharge establishments.

The water diversion structures of Taleghan including Sangban and Ziaran diversion dams and conveyance tunnel were constructed in a period of 4 years (1970-1974). The length of tunnel is about 9 km in a diameter of 3.6m and capacity of 30m³/sec. The construction of irrigation system started in 1974 and completed in 1997 with a nearly 17 years behind the planned schedule.

The Taleghan storage dam construction in a total capacity of 450 mm³ was constructed in a 46 months period since 2000, with a delay of two decades comparing to initial scheduled period, and it is under operation.

Based on planned operation schedule, the annually allocated water for irrigation of the Ghazvin area is 279 mm³ and 20 mm³ for artificial recharge (usually in non irrigation season) and 150 mm³ to be conveyed to Tehran metropolitan as a partial supplying of needed domestic water and 12 mm³ for down stream water rights and sustaining the environment requirements.

Out of 425 ha. designed for the ground water artificial recharge, only 135 ha is implemented and under operation, the remaining designed part is planned to be carried out as an important section of the project. The general specifications of Ghazvin irrigation system are as follows:

- The total gross project area: 80,000 ha.
- The concrete main canal (feeder canal), 94.3 km in length with a capacity of 30-3 m³/sec and concrete lined.
- Concrete lined laterals (L), in a length of 214.7 km and capacity of 600-7900 lit/sec.
- Concrete lined tertiary canals, in a length of 262 km and capacity of 170-1000 lit/sec.
- Concrete lined quaternary canals (irrigation ditches), in a length of 481.9 km and capacity of 170-340 lit/sec.

ACCESSIBLE WATER RESOURCES

Irrigation water requirements has been supplied from two combined surface and ground water sources as indicated in following table:

(In mm³ annually)

Source of water	Initially planned	Mean annually used water in past 3 decodes	Future potentially available water from Taleghan reservoir in normal condition
Conveyed surface water from Taleghan	279	142.2	279
Conveyed surface water from Taleghan for artificial recharge	60	19.8	20
Exploited ground water (for irrigation, domestic and industrial uses)	194.4	433.8 ⁽¹⁾	334.5
Local streams (mainly intermittent streams)	6.7	16.0	16.0
Total	480.1	611.8	629.5

1) Based on accessed data in 2003 it amounts to 463 and on last 5 years' mean it amounts to 430 mm³ annually

The irrigation system initially was managed by the Ghazvin Area Irrigation Project, and since 1993, the Management, Operation and Maintenance (MO&M) is being implemented by Ghazvin Area Irrigation Operation Company (GAIOC). The GAIP was quite a governmental organization and GAIOC is affiliated to Ministry of Energy (MOE), and performs its assignments under supervision and according to MOE's regulations and policies.

The GAIOC established in 1991 but has been acting the management, operation and maintenance (MO&M) since 1993.

The main objects of GAIOC's establishments are as follows:

- Improvement of the irrigation system;
- Promotion the communication system between the water users and water resources management authorities;
- Increasing the irrigation efficiency, the water conveyance part in particular;
- Reducing the governmental costs;
- Improvement of agricultural water using system aiming the optimization of water using system;
- Making beneficial use of hydraulic structures and available equipments in irrigation systems.

- Improvement of the government's organizational structure and reducing the number of the engaged personnel;
- Preserving the governments' rights through timely collection of delivered water revenues, which might be achieved by company's more endeavors;
- Providing possible performance of MOE's policies including volumetric delivery of water;
- Extension of participation acceptance of water users in conservation of irrigation system.

- SHAREHOLDERS OF GAIOC:

- MOE holding privileged shares (49%)
- Saveh and Tehran province irrigation management companies holding 25% and 26% of shares respectively. Governmental management on irrigation system for a nearly 3 decades has caused serious difficulties and deficiencies.

- LAND EXPLOITATION SYSTEMS IN GHAZVIN AREA

Agricultural land exploitation systems in Ghazvin area has been established as absolute property, lease holding (tenancy), crop sharing and joint sharing, which in terms of percentage are conforming to 57.7%, 19.8%, 3.7% and 0.7% respectively.

THE EXISTING CONSTRAINTS IN FUNCTIONING OF THE PRESENT OVERALL MANAGEMENT OF THE GIS.

- A considerable part of the irrigation system is demolished or worn out;
- The basic factors for required water estimation and water allocation have nearly unchanged. During around the past 3 decades, the same applies to operation of the irrigation system;
- Irrigation efficiency is low and has a descending trend;
- The maintenance of the system is not carried out correctly;
- The water users are not participation in irrigation management;
- Existing farmers organizations (associations, unions and provincial associations) are participating only in water distribution and partial maintenance of the system;
- There are inconformities in management of combined uses of surface and ground water;
- In spite of volumetric delivery of water, the measurement hydraulic structures are not enough calibrated.
- As the irrigation structures and service roads are deteriorated, their required efficiency has diminished.

PARTICIPATION OF WATER USERS' IN IRRIGATION MANAGEMENT, THE RELEVANT TAKEN MEASURES

Along with the enforcement of the state's privatization policy and decreasing its dominated management on irrigation as well, in the 2005, in order to establish the water users' organizations in GA, aiming the improvement of the irrigation system's management, and in some occasion for IMT from state to water users, measures have been taken, of which, the most recognized ones are as follows:

- In late 1998 as a pilot, in one of the laterals (L2), 12 water users' cooperatives were established and registered, and in early 1999 their relevant union was established.

The idea was to transfer the irrigation management of L2 to the mentioned cooperatives, assuming, in case of successful achievement, it would applied to the whole area i.e. management, operation and maintenance of the irrigation system might be assigned to the water users' established cooperatives.

The above mentioned cooperatives were disorganized in 2001, some of evidences which caused non achievement of the expected objects are:

- Not award and voluntarily attendance of farmers in organizing the cooperatives;
 - Lack of support and non achievement of promised support already rendered by in charged public sections.
 - Lack of verified liabilities and authorities.
- In early 2002, subsequent efforts aiming the establishment of WUOs started in all over the area, and as a result, in 2005, 158 so called "anjoman haay-e senfy" or guild association of water users and their 8 related so called "Ettahadieh" or union and one so called "Kanoon-e-Markazy-e-Anjoman haay-e Senfy-e Kar farmaee Abyary-e ostan-e Ghazvin" or the provincial association of Ghazvin province were established.

These WUAs are functioning based on an agreement with GISOC and their liability are limited to irrigation water distribution and a small portion of maintenance of the system.

DAMAGES AND LOSSES

Although the establishment of WUAs but not their sufficient participation in MO&M process during last 18 months relatively improved their capability in following up their requirement and promoted the WUAs' encouragement; and also have made them subject to some organization and authorities, but for the time being, the WUAs are confronting constraints and challenges as follows:

- 1- The establishment of WUAs has not been formed according their will, not based on their requirements, and not performed by the farmers.
- 2- The selected legal structures for the mentioned organizations are not compatible to the nature of the farmers' activities and necessities. They have been formed and registered according to the Labor Act and Criteria for organizations called society, union and association which verifies the laboring environment instead of introducing the agricultural WUAs' and its necessities.

- 3- The established organizations are not recognized as legal entities (corporate bodies) and are not supported by the administrative affiliated to the Ministry of Energy and Ministry of Jihad Agriculture (MOJA).
- 4- These organizations have not been assumed as participating in decision making in the process of management, operation and maintenance of irrigation system, and as a sub-contractor, they partially carry out the assignments and liabilities of the GISOC.
- 5- The established organizations are not financially, technically and administratively capable and are not independent in decision making for irrigation management.
- 6- Among the assigned forms for the recently established organizations only the title of "irrigation association" conforms the Labor Act, but two other forms (union and guild association) are not verified in Labor Act. There are no definitions for (Irrigation Union or Guild Association) in Labor Act.

INFLUENCING CAUSES OF CREATED CONSTRAINTS AND INSUFFICIENCIES

- 1- Non participation of farmers in irrigation management as a result of the public section's management.
- 2- Lack of coordination among the relevant organizations and administrative of public section (stakeholders).
- 3- Lack of a clarified strategy for IMT to the farmers.
- 4- Existing a general tendency of decision making and personnel of relevant public section in imposing their evident or hidden ideas, methods and objects on the farmers.

The dominant public section's management on the Ghazvin Irrigation System has carried out its plans and designs for the improvement of the irrigation system, without a fundamental reform in existing relevant organizations, without taking into consideration the local society's desired needs, and in lack of providing required facilities for participation of the farmers. Such an approach¹ and circumstances caused deficiencies and some mismanagements in establishing the above mentioned organizations as well as the participation of the water users in the process of MO&M of Ghazvin irrigation system, which resulted in existing undesirable condition and inefficiency of Ghazvin irrigation system.

SOLUTIONS AND EXECUTIVE REMEDIES

A- SOLUTIONS:

- Reforming the existing GISOC organizational structure to a private company;

1- The irrigation agency's staff (the government), mostly are incompatible with the nature and the approach of participatory management, and having a long term link to bureaucratic formalities, which in many cases revealed as problem against participatory management.

- Reforming the existing water users Guild Association (WUGA) into private GIOC (private joint stock company),
- Reforming the legal structure of existing guild associations as water users associations (WUAs);
- Transfer GISOC's shares to WUAs;
- Distribution of WUA's shares among the entitled members;
- Providing necessary conditions, sources and facilities in Ghazvin Regional Water Company (GRWC) and Ghazvin Jihad Agriculture organization (GJAO); for supervision, guiding, supporting the WUAs' and to pursue all their related issues.

B- EXECUTIVE REMEDIES:

- Transferring 51 percent of existing GISOC private shares to WUAs.
- In this stage, following the administration formalities and the agreement of private shareholders, 51% of GISOC's private shares of the company have to be transferred to WUAs.
- Changing the privileged shares of GISOC (49 percent of MOE's shares) into ordinary shares;
- After drawing up the formal process-verbals and necessary documents for transferring the shares, and performing the official formalities, 3 members of GISOC board should be selected by WUAs, and then, the company's managing director should be appointed by the board.
- Thereafter, the company and its new elected board of directors as a corporate body with a reliable legal standing is assumed liable to its commitments raised from irrigation managements transferred by the GRWC.
- A competent consulting engineers might cooperate the GRWC along the above mentioned process and will make required supervisions and services.
- The mentioned remained 49 percent public agency (MOE) owned shares have to be transferred to the WUAs by concerned public organizations (MOE, privatization organization, etc...).
- Making necessary rearrangements in the company's board; hereinafter, all members of the board are being elected by WUAs and all WUAs members are assumed as shareholders of the private joint stock company.

C- MEASURES WHICH HAVE TO BE TAKEN BY PUBLIC RELATED AGENCIES ALONG WITH TRANSFERRING THE COMPANY'S SHARES TO WUAS:

- Establishment of "coordination & arrangement" & "supervision" sections for WUAs' affairs and issues in GRWC;
- Establishment of a "coordination and arrangement" section for WUAs' affairs and issues in Ghazvin Jihad Agriculture Organization (GJAO);
- Providing the cadastral maps;

- Taking preparation measures of the farmers to change the existing flow (gravity) irrigation method in quaternary canals (head ditches) into pressurized irrigation method as the pressurized irrigation development in the area;

D- FORECASTS AND MEASURES WHICH HAVE TO BE TAKEN FOR ACHIEVING DESIRABLE MANAGEMENT, MAINTENANCE AND SUSTAINABLE OPERATION OF THE IRRIGATION SYSTEM:

- Establishing the Information System;
- Establishing the Monitoring and Evaluation System;
- Relevant legal, financial and administrative training of WUAs' staff;
- Verifying the needed financial sources including:
 - Water price
 - The government subsidies
 - Low rate or without interest loans
 - Other possible sources
- Technical and financial audit of WUAs' financial operation performance by an independent auditor.

PREREQUISITES AND PRIMARY ACTIONS FOR ACHIEVING THE PLANNED OBJECTS

A: CAPACITY DEVELOPMENT AND MOBILIZATION OF THE INVOLVED PUBLIC ORGANIZATIONS (GRWC-GJAO), WORKS TO BE CARRIED OUT:

- Holding discussion and exchange of views participated by involved officials and experts while benefiting from methods and techniques of Participatory Approach.
- Establishment of "coordination and arrangement" sections for WUAs' affairs in both above mentioned organizations;
- Establishment of "supervision" section related to WUAs;
- Appointment of "WUAs' empowerment executive group" composed of delegates from GRWC, GJAO, WUAs, each member of the group will attend based on needed expertise;
- Arrangement of executive plan for the empowerment of WUAs;
- Introducing central group members for supervision over executive group.

The GRWC is liable for setting up the workshop, the required engineering service will be provided by consulting engineers.

B: CAPACITY DEVELOPMENT AND EMPOWERING THE FARMERS:

- The activities related to empowerment of the farmers are mainly:

- Holding training workshops for WUAs' board members and WUAs' members as well, in these workshops they will be acquainted with exercising methods and know how of Participatory Rural Appraisal (PRA) among the others, preparation of social and natural resources' maps, Venn diagram, seasonal calendar, problem tree, their related impacts and conclusions and problem solutions, and also verifying activities, designing the executive plans, consequently while they acquiring precise information about the irrigation system, will be able to attain skills of negotiation, convincing and to be convinced, data collection and data analysis, to feel responsible and liable, decision making, respecting each other and participating in joint activities and they will be prepared for achieving the objects and designed plans.

Some of objects or expected conclusions of capacity development and empowerment of farmers are:

- Farmers have to be organized in a manner that they might be able to perform the maintenance and rehabilitation of the irrigation system without receiving any contribution (help) from the government;
 - The board of directors of WUAs to achieve enough skill in settlement of disputes raised among the farmers;
 - Preventing financial disorders and corruption which might appear after IMT;
 - To improve WUAs' reliability, i.e. to improve the capacity and ability of WUAs for confidence and honesty making that the applied policies for leading the irrigation management is compatible with farmers' common requirements;
 - Increasing savings by water users as a security for long period sustainability of irrigation system, the farmers, generally are reluctant in long term investment for non clarified objects, applying participatory methods and planning and carrying out the empowerment programs, desired backgrounds for the above purpose might be provided.
- Participation of farmers in rehabilitation of the irrigation system (IS):
- In case of securing the rehabilitation of the IS prior to IMT, it helps to strengthen the idea of ownership of the system by the government, and the farmers will keep in their mind that the government will bear the rehabilitation's future costs.
 - In the event of rehabilitation prior to IMT, because of possible financial deficiencies and time consuming administration formalities, it might postpone the IMT process, which could discourage the involved local agencies to participate effectively, in addition to that , a long term reform might make the elongated process subject to unstable political events which endangers carrying out the IMT programmes;
 - It is preferred that from the beginning of rehabilitation process to keep the WUAs' representatives informed and provide desirable condition for their cooperation with GRWC, and involved consulting Eng. and contractor;

- Simultaneity of IM improvement and physical rehabilitation, causes to facilitate and expedite the reform process and also it makes the involved agencies, (stake holders) effective participation; before the IMT, the government will secure the rehabilitation costs of the main canal, lateral and tertiary canals but in case of quaternary canals (head ditches). The WUAs are liable to improve and rehabilitate.

One of the main included objects in setting up the training workshops is to consider and decide about the necessity and importance of farmers' participation in rehabilitation of quaternary canals (head ditches), to be carried out along with other canals, the farmers in training workshops will compare different options for rehabilitation of quaternary canals, rehabilitation of existing system or modifying irrigation from gravity to pressurized system, and selection of more convenient option.

In the event that, the farmers need financial facilities for rehabilitation of the quaternary canals, they might receive the needed money partially or totally as banking loan, based on current criteria and regulations.

SUMMING UP AND CONCLUSIONS

- 1- Proposed remedies and solutions are based on conclusions from the studies and analysis and include the main measures have to be taken to meet the IMT requirements;
- 2- The origin of the difficulties lies in centralized planning and government's irrigation management shadowed the GIS for a period of 3 decades. In order to overcome those difficulties, informing and empowerment of the WUAs should be carried out from one side and from the other hand the background for reforming and capacity development of the related public sections' staff has to be provided in such a way that the expected reform and transformation based on the joint participation to be materialized.
- 3- Overall and perfect planning, efficient management, constant following up the related activities, constructive discipline and continuous care, are provisions for successful irrigation management improvement plans. Any thing has not to be thought evident and simple, the best way of good performance is thinking and the most perfect thinking is acting. The thinking which clarifies the action in turn gives information about the action, and the action which gives information to thinking, takes information from thinking.
- 4- Improving the objects and plans in the absence of a system of management and monitoring in the beginning stage and without establishment of an evaluation system, will confront with difficulties in the execution process. Timely recognizing the problems, removing the difficulties fastly, preventing any deviation of project's rehabilitation activities, are overally possible through continuous following up the works and moving along a precise direction.
- 5- The successful IMT requires overall national efforts along the participatory direction and the WUAs have to be supported and the local societies' skills and efforts must be sustained and carried on as well.

- 6- Planning and successful execution of the participatory programmes such as arrangement or participatory irrigation management (PIM) is much more difficult and complicated than carrying out the centralized plans.
 - a. As a matter of fact, in relation with the farmers, they take long time to achieve participatory insight and nature, and concerning the government's staff, also they need long period to put aside their bureaucratic behavior and to make self compatible to participatory approach. Although the young tree of participation grows slowly and gets gradual stability but it stands sustainable and becomes fruitful.
- 7- Verifying the objects and plans, carrying out the activities and following up the work, all need cooperation of competent and experienced consulting engineers and experts in participatory methods.
- 8- The involved public organizations' determination and goodwill, their planning based on thoughtfulness and providing pre necessities and convenient basis for performing the related process all together are the first priority requirements.

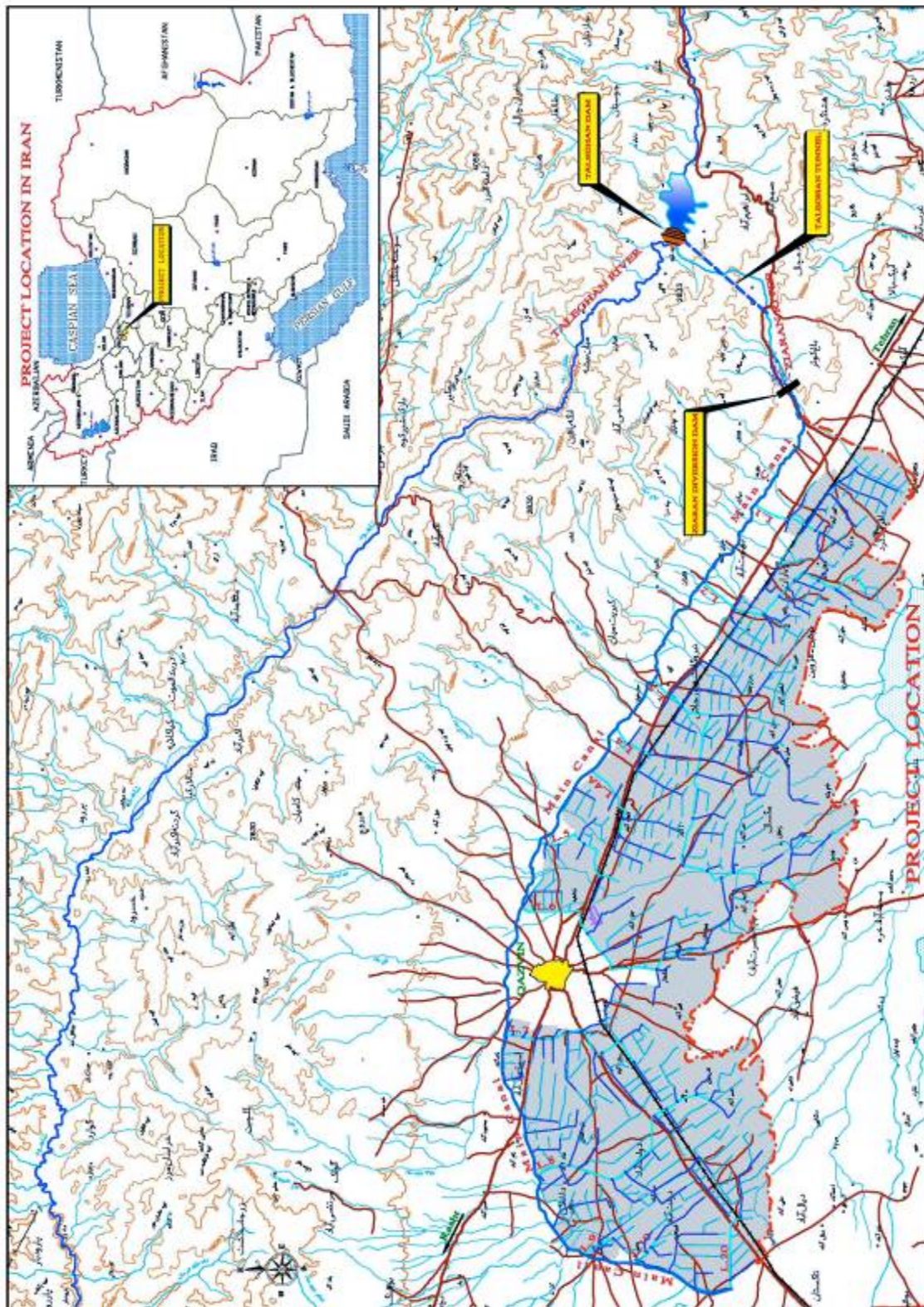


Figure 1: Map of Ghazvin Irrigation Network

ABBREVIATIONS:

GDP:	Ghazvin Development Project
GISOC:	Ghazvin Irrigation System Operation Company
GIS:	Ghazvin Irrigation System
GAIP:	Ghazvin Area Irrigation Project
GAIOC:	Ghazvin Area Irrigation Operation Company
GARO:	Ghazvin Area Reclamation Organization
GAIS:	Ghazvin Area Irrigation System
GRWC:	Ghazvin Regional Water Company
IMT:	Irrigation Management Transfer
IM:	Irrigation Management
MOJA:	Ministry of Jihad Agriculture
MO&M:	Management, Operation and Maintenance
MOE:	Ministry of Energy
O&M:	Operation and Maintenance
WUAs:	Water Users Associations
PA:	Participatory Approach
PRA:	Participatory Rural Appraisal

REFERENCES

- 1- Rehabilitation studies of Ghazvin irrigation and drainage system – conclusions – Pandam Consulting Engs. 2006 Tehran.
- 2- Regulations of irrigation and drainage system operation and maintenance companies – Management and Planning Organization of Iran – 2003 Tehran.
- 3- Guidelines for irrigation management services transfer – publication No. 55 – Iranian National Committee on Irrigation & Drainage (IRNCID) – 2002- Tehran.
- 4- Participatory Approach, (methods and techniques), Hableh Rud Project – Dr. Parviz Homayounpoor, 2000- Tehran.