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manager transfer / irrigation management / conflicts  
Government managed irrigation systems / water users Associations

Nepal

Panchkanya irrigation Project

Khageri Irrigation Project

# Analysis of Process and Impacts of Management Transfer in Khageri and Panchkanya Irrigation Project: The Lesson learned

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## INTRODUCTION

Khageri Irrigation System (KHIS) is one of the oldest agency managed irrigation systems located in Chitwan District in Western Nepal. It provides irrigation to about 3,900 ha of land in the West Chitwan. The construction of the system was initiated in 2017 B. S. and completed in 2024 B. S. at the cost of Rs 7.6 million. The physical structures of the system include a diversion barrage, 23-km long main canal, 55 km of branch canals and 100-km long tertiary canals. About 7 km of the main canal passes through the buffer zone of Royal Chitwan National Park, where many lakes have been formed due to regular canal flow. These lakes serve as water reservoirs and augment the water supply to the main canal besides regular supply obtained from Khageri River.

Panchkanya Irrigation System (PIS), relatively a small system of 600 ha located in the upstream of the Khageri river, was initially constructed by local Tharus more than 60 years ago. The system came under government control after Chitwan Irrigation Project constructed a permanent weir and lined the canal systems. The system is again going to be turned over to the farmers in near future, after completing necessary improvement works by the Irrigation Management Transfer Project (IMTP). The layout pictures of both Khageri and Panchkanya System are shown in included figures.

The responsibility of operation and maintenance of both Khageri and Panchkanya Systems was with Chitwan Irrigation Project. After the termination of AsDB Loan to Chitwan Irrigation Project, the budgetary allocations for operation and maintenance of the systems were less than actually needed. Performances of these systems were declining due to lack of proper maintenance and upkeep resulting to decline in productivity over the years.

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# **IMPLEMENTATION UNDER IRRIGATION MANAGEMENT TRANSFER PROJECT (IMTP)**

## **IMTP Program Initiation**

Joint Management and turnover programs were launched in 1993 in several Department of Irrigation managed schemes including Khageri and Panchkanya after the formulation of irrigation policy in 1992. The irrigation policy 1992 adopted two distinct plans of actions for the Agency Managed Irrigation Systems (AMISs). They are, (a) Joint Management: aiming to initiate and promote shared operation and management responsibilities of large scale irrigation systems between DOI and users, and (b) turnover aiming to transfer the management responsibility from DOI to the users. In order to promote the process of management transfer, irrigation management transfer project was conceived by the government with the support from Asian Development Bank and the USAID. The project aims to transfer the system management to the Water User Associations (WUAs) partly or wholly depending upon the project size. The first phase of the program has already been launched in three different projects namely Panchkanya (600 ha), Khageri (3,900 ha), and West Gandak (10,300 ha).

Khageri and Panchkanya schemes were brought to joint management in 1993 to initiate the process of management transfer. Water Users' Associations were formed in both the schemes and registered as per constitution and bylaws. The WUA in Khageri scheme is a federated two-tier organization: the main committee at the system level and the Branch Committee at the branch canal level.

At the beginning of the joint management, there were lots of confusions about the program. The parties involved (DOI and WUA) were not clear of their roles and responsibilities. There were misunderstandings on authority as well. Training, seminars, workshops and field visit programs were very helpful in clarifying the roles and responsibilities. The WUA started collecting the water charge and was actively involved in operation of the system. Maintenance was still carried out by the Department of Irrigation. WUA's role in conflict resolution and on farm water management was also very encouraging.

## **The Management Transfer Implementation Period**

When the management transfer project was introduced in these systems, the WUAs had already two years of experience and the functionaries of WUA had completed their first term of tenure. In the second term election, same persons were elected for the positions of

president, vice president and general secretary and there were some changes in the positions of other functionaries. The first step in the process of IMTP was the preparation of Action Plan (AP). The action plan forms the basis for project implementation. It also clarified the roles and responsibilities of DOI and WUA during and after the turnover to some extent. A detailed walk-through of the system was carried out in each branch and main canal to find out the types and nature of the rehabilitation works. The whole rehabilitation work was divided into five categories: (a) deferred maintenance (b) emergency work (c) catch up maintenance (d) structural improvement, and (e) farm to village roads. The rehabilitation work was finalized after detail discussions with respective WUAs (both Main and Branch Committees). The main features of the action plan have been as under:

1. Turnover of Panchkanya irrigation system after completion of rehabilitation works. A memorandum of understanding was signed between the WUA main committee and DOI to this effect.
2. Turnover of all systems except headwork and main canal in Khageri System.
3. A five-member sub-project management committee headed by sub-project manager to execute and supervise the construction works.
4. Resource mobilization equivalent to 26 percent of total cost of rehabilitation to be mobilized by WUA.
5. A budgetary allocation of Rs 52.5 million for Khageri and Rs 6.85 million for Panchkanya to execute the turnover program.

After the finalizing the Action Plan (AP), a Memorandum of Understanding (MOU) was signed between the WUA main committee and the DOI. Construction activities were started immediately after the signing of memorandum of understanding.

### **Present Status**

As of now, major construction works have been completed in Panchkanya and the system has been decided to hand over to the WUA. More than 60 percent of construction works have been completed in Khageri and seven out of 13 branch canals have been turned over to WUAs. Three more branch canals are expected to be turned over by Jan. 1998 to the branch level committees. The proposed 26 percent participation in resource mobilization could not be achieved in both the systems. It is generally expected that in Khageri about 15 percent of the resources would be mobilized by the users while in Panchkanya, users' share in resource mobilization would be as high as 20 percent.

Training, workshops and field visits, supported each phase of construction activities. They have been helpful in successful implementation of the project. The training of the users in share system development, organizational management, record keeping and quality control has helped bringing positive changes in attitude, operation and management capabilities and organizational development.

The chronologies of major events in Khageri and Panchkanya systems are given in Tables 1 and 2.

## **IMPACTS AND ACHIEVEMENT**

It is too early to judge the impact and the achievement as the process of turnover has just started. However, some noticeable changes have been observed in resource generation, conflict resolution, water management and characteristics and performance of agricultural system. They are discussed below.

### **Irrigation Management and Cropping Intensity**

Khageri and Panchkanya Irrigation System were initially designed to irrigate 3,900 ha and 600 ha, respectively. However, the areas under irrigation before IMTP intervention were only 2,400 ha in Khageri and 267 ha in Panchkanya. The main reasons for lower irrigated areas in these projects are:

- Reduction in the dependable water supply at the source due to environmental degradation.
- Lack of proper maintenance of canal system
- Inequitable water distribution.
- Poor on-farm water management practices.

The water loss in Panchkanya was considerably higher. As high as 40 percent of water loss had been observed in 2 km of canal length. It was realized that Panchkanya could deliver supply to its designed area if the heavy seepage could be controlled. However, in Khageri, water supply to whole area was not possible even with the best management practice due to limitation of available supply at the source itself.

After the IMTP intervention, Panchkanya is on the way of recovering its total command area. By this year, about 402 ha is coming under irrigation and within a year or two, this could increase to 600 ha. The overall conveyance efficiency is expected to increase from 26 to 51 percent. Area under early paddy has also increased from 29 ha to 75 ha.

The irrigation frequency has been changed to 3 days from earlier 12 days implementing new irrigation schedule and the stress period reduced to zero from earlier 7 days. Before

IMTP, deficit irrigation was being practiced which was one of the reasons for reduced production. It can be expected that the rice production would be increased by more than 23 percent. Prior to IMTP intervention, water distribution was inequitable and even as high as 30 l/s/ha in some outlets. Now, equitable water distribution of 3.16 l/s/ha exists throughout the command area.

The magnitude of change that is observed in Panchkanya may not be expected in Khageri due deficit supply at the source. The available irrigation duty in Khageri is about 1.25 l/s per ha against the requirement of about 1.8 l/s/ha. It was, therefore, decided to augment the supply in Khageri from Chitwan lift Irrigation system by about 2.2 m<sup>3</sup>/s. But it could not be done due to financial and technical reasons of the pumping systems. Nevertheless, the irrigated areas upon management transfer have changed to 2,900 ha from existing 2,400 ha. The area under early paddy has increased from 350 to 600 ha. There is more equitable water distribution in head, middle and tail portions of the system. Water distribution is being practiced in a systematic way to make up the deficit in the canal system. However, the entire command area cannot be fully irrigated unless the supply at the source is increased. With improved management, a total of 3,400 ha could be brought under irrigation. The changes observed so far in cropping intensity and efficiency are shown in Table 1.

## Resource Generation

There has been a gradual increase in resource generation by the WUAs: Collection of Irrigation Service Fee (ISF) has been the main resource to WUA. Khageri started service fee collection from farmers three years back, whereas in Panchkanya, collection of irrigation service fee started since last year only. The rate of irrigation service fee is Rs 90/ha per crop in Panchkanya and Rs 60 per ha per crop in Khageri. Panchkanya has already distributed 94 percent share certificates (based on existing area of 267 ha), 93 percent membership and the irrigation service fee collection has been about 84 percent. The WUA has about Rs 49,600 in its bank account. The WUA general assembly is planning to increase the service fee to Rs 150/ha per crop from existing Rs 90/ha/crop. The WUA finally envisages collecting Rs 300/ha/crop within 2 years of time. This will provide WUA enough funds for annual operation and maintenance and adequate budgetary provisions for future rehabilitation. There are no other possible income sources except irrigation service fees in Panchkanya.

Khageri has also achieved substantial progress in resource generation. Beside irrigation fee, Khageri also generates revenue from:

- i) land it has received from DOI.
- ii) fishing contracts in the canal.
- iii) working as a Cooperative, selling fertilizers and seeds.

However, its main source of revenue is service fee collection. The progress in irrigation service fee collection has been that about 65 percent of the members are paying fee regularly. The irrigation fee is Rs 60 per ha/crop. The Khageri WUA main committee has about Rs 290,000 in its bank account and the branch committees have about Rs 200,000 in their accounts. The branch committees of Khageri are required to deposit 40 percent of irrigation collected fees to the main committee. The details of Irrigation fee collection of both Khageri and Panchkanya are given in Table 4.

## **Conflict Resolution**

After the formation of WUAs, the frequencies of disputes and conflicts have reduced with the intervention of WUA. Those that remain unresolved by WUA can be brought to irrigation office. However, no such cases have been brought to the irrigation office from Panchkanya while only few cases have been brought in Khageri that are mostly related to land encroachment. Disputes on water distribution and water right issues are totally resolved by WUAs with technical advice from the office.

## **ISSUES**

Farmers of Nepal have been harnessing available water resources for irrigation to the best of their abilities. Farmers' ability to run relatively large and technically complex system has been best demonstrated by Chattismauja and Budi Kulo Irrigation Schemes. However, when an agency managed scheme is turned over to the public, many issues and problems get evolved during the process of turnover. At large, irrigation is being considered a free commodity and it is really difficult to change this attitude. With the advent of democracy, people's expectation has increased where as IMTP's concept is to decrease the government burden and make people more responsible for their systems. One of the key concerns of the IMTP has been to ensure sustainability of the irrigation schemes turned over. Merely handing over the projects to Water Users' Association does not lead to economic sustainability unless operation and maintenance costs are at least recovered on a sustainable basis. The target of full cost recovery including capital investment in irrigation sector is far from imagination at present context.

Theoretically, it is believed that the shifting of detached central management from DOI to decentralized local management by WUA is more efficient. In this context WUAs' capability in providing leadership to the farmers for resource generation, efficient water management, conflict resolution will play crucial role in the success of management transfer. A strong sustainable WUA is thus a major requirement for the success of turnover program. What are the factors that affect the sustainability of WUA? What are incentives to be provided? What is the legal basis of transfer? What are the factors required empowering the WUA? To what extent WUA can exercise its authority? These

are some of the outstanding issues that are to be addressed properly for the success of the turnover program. The following important issues and problems seem to be emerging in Khageri and Panchkanya Irrigation Systems.

### **Legal Basis**

The new authority (the WUAs) which is going to takeover the management responsibility should have strong legal basis for the control over the system. Lack of legal recognition will affect a lot especially on conflict resolution and revenue generation. How the WUA can protect the properties (land, infrastructures, etc.) that it acquires from the government? What legal action can it take if the canal's right of way is encroached? If farmers do not pay the ISF, what action could it take? Preventing selected customer from service is not possible in irrigation as in drinking water supply or electricity. These are the common problems encountered by the WUAs. Written rules and regulation only will not solve these practical problems.

In early period of turnover, district administrative office should be informed for quick action against land encroachment or property damage upon request from the concerned WUA. The problem of revenue generation could largely be solved if WUA is authorized to prohibit from taking loan from the bank or selling their land if he does not pay the water tax. Village Development Committees could also play crucial role in making farmers pay the irrigation fee.

### **Policy and Commitment**

Clear policy and commitment from higher levels should support any program. The roles and responsibilities of each party involved (DOI and WUA) in the process of management transfer should be clearly defined, otherwise conflicts over the authority will certainly arise especially on jointly managed schemes. Clear policy and guidelines will not only reduce the conflicts between WUA and farmer but also between the farmers themselves.

High level support (including political) is very important for the success of IMTP. It is likely that the turnover schemes may again turn to government for grants making use of political forces after few years of time. It would be against IMTP objective if such helps were provided which are not mentioned in the memorandum of understanding. If some schemes are unduly favored, it may damage the turnover process as a whole. Furthermore, government's policy should be uniform for similar types of projects all over the country. In case of joint management schemes, government's roles should be limited to operation and maintenance of technically complex structures and this should be made clear to WUA before the completion of turnover program.

## **Physical Status of the System**

When a system is to be turned over to the WUA, all the physical infrastructure of irrigation system should be in proper condition. What are the technical changes required in the system when it is turned over to the WUA? Will the WUA be capable of handling the existing complex system? What are the modifications to be made in the system and at what cost? These are general questions that need to be answered before the turnover program is initiated. For example, both Panchkanya and Khageri changed their water distribution patterns when they started the canal operation. Their policy was to increase the flow volume in the outlets or branches but to decrease the time allotment. This required construction of more cross regulators and to increased size of outlets.

## **Conflicts and Water Right Issues**

The problem of equitable water distribution is common in the agency managed irrigation schemes that remain the major source of conflicts. Water right problem may exist between two different schemes or between two different sectors within a system. This problem can be solved by evaluating the share of water that each unit or block within the command area receives from actual measurement on sites.

## **Resource Generation**

Success of turnover program largely depends on the WUAs' ability to mobilize internal resources. However, existing level of resource generation and mobilization in all the turnover schemes are not up to the desired level. Even for systems like Panchkanya and Khageri, which are free from problems of silt, flood damages or slides and are very simple to operate (such problems are very common in other irrigation schemes), the annual operation and maintenance cost is about Rs 400/ha for Panchkanya and Rs 500/ha for Khageri. This figure may be higher than Rs 800/ha for other projects. Even if the WUAs are able to mobilize 25 percent of operation and maintenance cost by voluntary labor contribution, then WUAs of Panchkanya and Khageri must collect Rs 300 and 375/ha for the system to be economically sustainable. The existing collections of Rs 90/ha per crop in Panchkanya and Rs 60/ha/per crop in Khageri are far below than actually required to keep the system in proper condition. It is, therefore, very essential that these WUAs increase their irrigation fees at least by two folds immediately. External sources can also be mobilized especially in large projects. They may be as rentals, taxes or income from the sale of grass or trees of the canal area. However, such sources cannot be guaranteed and the use of resources like community forest to subsidize the canal irrigation may also be questioned in future. If economic sustainability is to be achieved, the irrigation fee should meet the major portion of operation and maintenance cost. If the WUAs fail to increase the service fee rates, the system productivity will again decrease and the history will repeat again and the situation will be even worse than today.



## **Farmers' Attitude**

Farmers' attitude is important for the success of IMTP. Common farmers now support the program but fear of anarchy after take over by the WUA. They have not yet developed full confidence on the new authority (WUA). Training and field visits at the local levels are found to be very helpful in eliminating such feelings. People will support the concept if they are assured that their income is increased after a new management system.

## **Ownership Status**

The present policy of management transfer does not involve the ownership transfer, but only the utility transfer. In this context, the WUAs may be reluctant for further expansion of system with the fear that the properties will be back again to the government. At the same time, if the properties transferred by the government are damaged or misused, who bears this cost? The government should guarantee the return of WUA investment in the system if it takes over the system again and at the same time any damage done to the property should be borne by the WUA. From the above discussions, the issues can be ranked in the following order:

1. Resource generation and mobilization.
2. Legal basis.
3. Attitude.
4. Policies/higher level commitment.
5. Water right issues and conflicts.
6. Physical status of the system.
7. Ownership status.

## **CONCLUSION AND RECOMMENDATIONS**

Farmers' ability to run even larger and technically complex systems have been successfully demonstrated by some farmer managed irrigation systems in Nepal and there are grounds to believe on this. However, farmers' attitude should be changed and their institutional capabilities need to be built up and sound procedures of generating and mobilizing the resources should be developed. Government's funding support should be continued to those cases that are beyond the capacity of farmers.

In a country like Nepal, where the agriculture sector is heavily subsidized and irrigation, so far, is considered as free commodity, it is really difficult to implement policies of management transfer. Are continuous funding on operation and maintenance of irrigation

system socially justified? Is it financially affordable? Certainly not! Then what should be our policy for the future? The management transfer will provide the best possible approach for system sustainability, as privatization in irrigation will be too optimistic under present scenario.

There are still different issues and problems regarding resource generation and mobilization such as legal basis of transfer, higher level commitment, resources generation, etc. Type and nature of the problems differ at different levels of project implementation. The type and nature of the problem may differ from place to place. No concrete method or policy can be prescribed as solution of these problems. Problems can never be avoided but can be minimized by adopting clear policies.

The following recommendations may be useful with regard to IMTP Implementation in future.

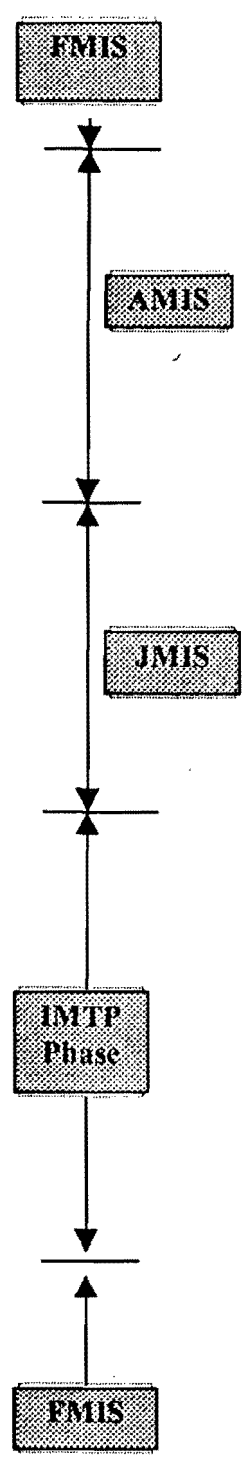
1. Training and field visit program, which are very crucial to change the attitude of farmer should be carried out at different levels (farmer's level, branch level, main committee) of WUA organization. In the past, such activities were confined mostly to main committee only.
2. The actually irrigated area and beneficiaries' list should be determined through household survey at the tertiary level (preparation of parcellary map) before construction starts. This will help evaluate the impact and to collect the service fees in the future.
3. Legal basis to control the system, status of ownership, roles and responsibilities of each party involved (DOI and WUA) should be defined at earlier stages of project implementation.
4. WUA should submit a resource generation plan to DOI and this should form the basis of project selection under IMTP.
5. Percentage of WUA contribution in IMTP seems higher and should be reduced at about 15 percent in general.

On going economic activities of open market policy and privatization strongly support the concept of management transfer. Running of canal systems by WUAs is invariably a cooperative venture and can be viewed as private sector involvement in the management of irrigation systems. Nothing is free in the world and irrigation can be no longer considered as free commodity. The concept of "user pays" should be practiced in irrigation sector too. The government's responsibility of operation and maintenance of irrigation system should be turned to the farmers and the concept of management transfer

provides a better way for it. Upon successful implementation of management transfer, the country will not only save millions of rupees annually, but will also improve system performance and productivity enhancing the economic sustainability.

Figure 1: Chronology of Major Events in Panchkanya

Year	Events
(1976)	Intervention by Chitwan Irrigation Project to rehabilitate the existing farmer's system.
(1978)	Rehabilitation over, responsibility came to DOI
March 051 (May 1994)	Formulation of constitution draft sub committee
March 051 (May 1994)	Constitution finalized and WUA registered
March 051 (June 1994)	First WUA election
March 052 (Jan 1996)	MOU between WUA & DOI signed
March 052 (Jan 1996)	Construction activity started
March 053 (May 1996)	Second WUA election
March 054 (June 1997)	Turnover of H/W in first 2.5 km of main canal & four branches.
March 054 (Jul 1997)	The whole system is turned over
March 054 (Sep 1997)	Major construction activity completed
March 054 (Sep 1997)	Calibration of system networks. New Irrigation Schedule established.



**Table 2: Chronology of Major Events in Khageri**

<b>Date</b>		<b>Events</b>
B. S. 2017	(1960)	Construction of KHIS begins
B. S 2024	(1967)	Construction completed
Kartik 049	(Oct.1992)	Formation of constitution draft sub committee
Mansir 049	(Nov.1992)	Finalization of constitution, WUA registered
Magh 049	(Feb 1993)	First election of WUA completed
Falgun 049	(Mar 1993)	Training on Share System to WUA
Shrawan-Bhadra 050	(Aug 1993)	Training on Discharge Measurement
Magh 051	(Feb 1995)	Second WUA election completed
Shrawan-Kartik 052	(Aug-Nov.1995)	Walk through activity
Poush 052	(Jan 1996)	Signing of MOU on IMTP
Magh 052	(Feb 1996)	GA decided to participate in IMTP
Magh 052	(Feb 1996)	Construction activity started
Magh 053	(Feb 1997)	Third election of WUA
Falgun 053	(Mar 1997)	Turnover of D <sub>1</sub> , D <sub>0</sub>
Falgun 053	(Mar 1997)	„ „ M <sub>1</sub>
Falgun 053	(Mar 1997)	„ „ D <sub>7</sub>
Chaitra 053	(Apr 1997)	„ „ D <sub>2</sub>
Baishakh 054	(May 1997)	„ „ D <sub>4</sub>
Baishakh 054	(May 1997)	„ „ D <sub>8</sub>
Bhadra 054	(Aug 1997)	„ „ D <sub>5</sub>



**Table 3: Achievement in Irrigation Management**

S. N.	Details	Panchkanya		Khageri	
		From	To	From	To
1	Area under summer rice (ha)	267	402	2400	2900
2	Area under early paddy (ha)	36	100	350	600
3	Overall efficiency (%)	26	51	30	36
4	Yield loss (%)	23	0	25	0
5	Irrigation turn (days)	12	3	11	11
6	Water share (l/s/ha)	5-30	3.16	3.0	1.25

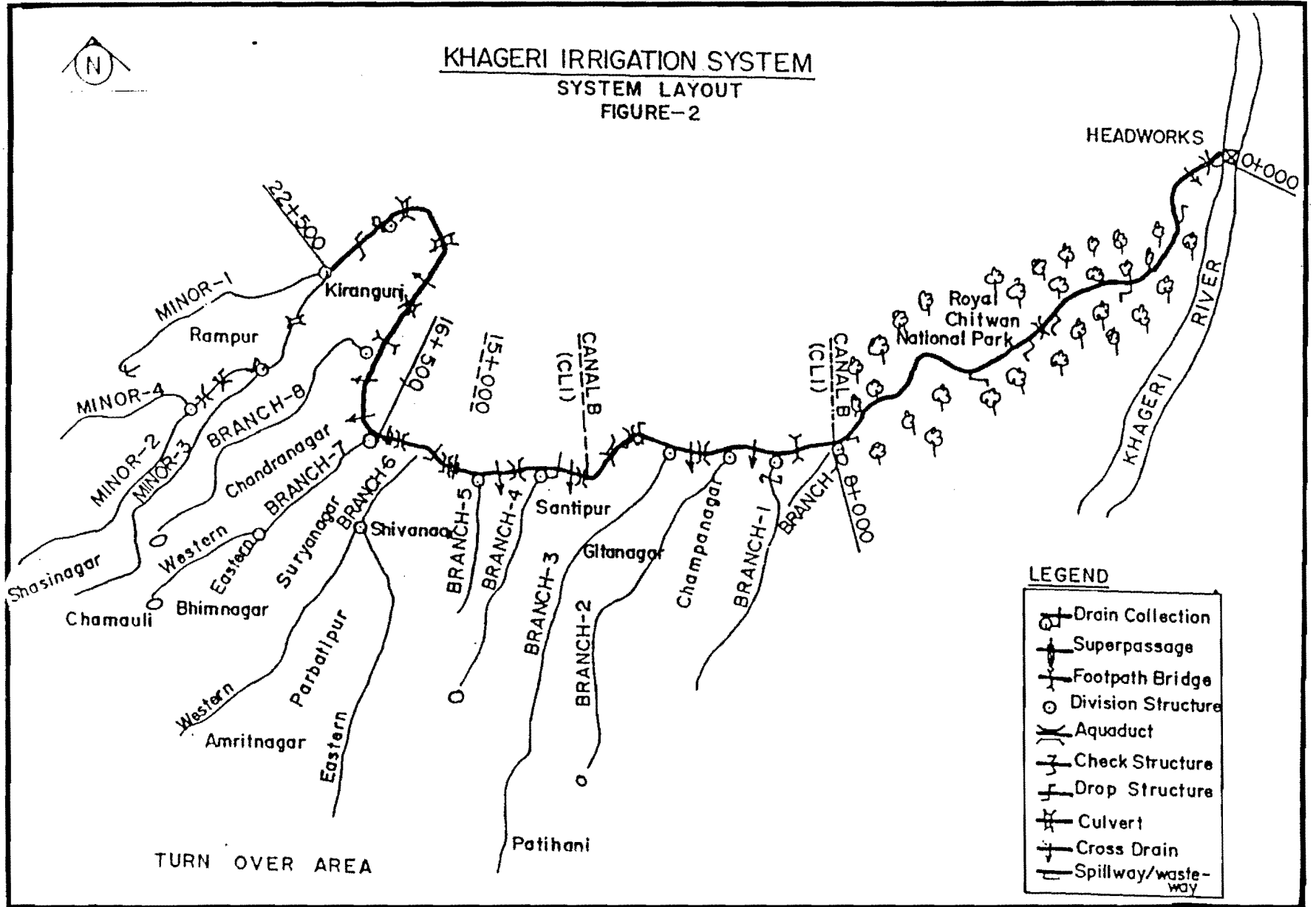
**Table 4: Achievement in Resource Generation**

S. N.	Details	Panchkanya	Khageri
1	ISF Collection	84 %	61 %
2	Membership	93 %	83 %
3	Share Distribution	94 %	Just started

# KHAGERI IRRIGATION SYSTEM

## SYSTEM LAYOUT

### FIGURE-2



**LEGEND**

	Drain Collection
	Superpassage
	Footpath Bridge
	Division Structure
	Aquaduct
	Check Structure
	Drop Structure
	Culvert
	Cross Drain
	Spillway/waste-way

# PANCHAKANYA IRRIGATION PROJECT

Scattered Spring Source

0+000 Intake  
0+200 Outlet-1

0+754 Escape  
0+800 Outlet-2

1+304 Outlet-3

1+571

1+606

1+788

BC-2 2+300

BC-3 3+085

BC-4 Bhedi

4+207

Mohna

4+713

BC-7

4+820

Baghmara

Gothauli

Chitrasali

BHARATPUR ←

Tadi

→ HETAUDA



**LEGEND:**

- Road
- - - Other Road
- Canal

TURN OVER AREA

B  
A  
L  
T  
A  
R

K  
H  
O  
L  
A  
  
Slasai

B  
C  
-  
1

B  
C  
-  
5

B  
C  
-  
6

K  
A  
I  
R

K  
H  
O  
L  
A