Evaluation of
Management Transfer Performance and Process

Irrigation Service Fees in Nepal

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Foreword

An important foundation of sustainable development of irrigated agriculture is the active participation of farmers in operation, maintenance and resource mobilization. Nepal's irrigation policy, which is periodically revised and updated, builds on this foundation. Transfer of management to organized groups of farmers, promotion of resource mobilization within irrigation systems for operation and maintenance, and institutional upgrading are gaining prominence in the irrigation sector of Nepal.

Nepal has a long tradition of sustainable management of irrigation systems. In recent history there has been a rapid development of irrigation facilities. In these new facilities, resource mobilization for cost recover, operations, and maintenance has been inadequate. The management transfer program in part was initiated to address problems of resource mobilization. While there has been substantial progress at transferred systems in the mobilization of resources, improvements must be made for sustainability. Action is needed to address these issues of insufficient resource mobilization. This research activity was formulated to identify means to improve resource mobilization through irrigation service fees.

The objective of this research exercise and report is to provide analysis and recommendations that could lead to improvements in irrigation service fee collection and utilization in systems where management has been fully or partially transferred to farmers. The report provides information related to Irrigation Service Fees that will be useful for policy makers and Water Users Associations. The study consists of a review of the status and performance of resource mobilization for operation and maintenance in farmer managed, agency managed, and systems where management transfer is in process.

The assignment consisted of extensive consultations with farmers and government officials. At a workshop attended by farmer leaders and representatives from the Ministry of Water Resources, Ministry of Agriculture, Ministry of Finance, Water and Energy Commission Secretariat, and Department of Irrigation, issues of irrigation service fees was discussed. The recommendations presented in this report are based on study findings and consultations.

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Acronyms

ADB	-	Asian Development Bank
ADB/N	-	Agriculture Development Bank of Nepal
AKIS	-	Aandhi Khola Irrigation System
AKWUA	-	Aandhi Khola Water Users Association
AMIS/s	-	Agency-Managed Irrigation System/s
APROSC	-	Agricultural Project Service Center
B. S.	-	Bikram Sambat
BLGWP	-	Bhairahwa Lumbini Ground Water Project
CDO	-	Chief District Office
d.n.	-	Data not available
DIHM	-	Department of Irrigation, Hydrology and Meteorology
DOI	-	Department of Irrigation
DTW	-	Deep Tube Well
FIWUD	-	Farm Irrigation and Water utilization Division
FMIS/s	-	Farmer-Managed Irrigation System/s
ha	-	Hectare
HMG/N	-	His Majesty's Government of Nepal
HRDTB	-	Human Resources Development and Training Branch
IIMI	-	International Irrigation Management Institute
ILC	-	Irrigation Line of Credit
IMD	-	Irrigation Management Division
IMT	-	Irrigation Management Transfer
IMTP	-	Irrigation Management Transfer Project
ISF	-	Irrigation Service Fee
IWMI	-	International Water Management Institute
JMIS/s	-	Jointly Managed Irrigation System/s
kg	-	Kilogram
lps	-	Liter per Second
M&E	-	Monitoring and Evaluation
MISU	-	Management Information System Unit
MOWR	-	Ministry of Water resources
NGO/s	-	Non-Government Organization/s
NISP	-	Nepal Irrigation Sector Project
NPC	-	National Planning Commission
NRs	-	Nepal Rupees
NZIDP	-	Narayani Zone Irrigation Development Project
O&M	-	Operation and Maintenance
PDMED	-	Planning, Design, Monitoring, and Evaluation Division
POP	-	Project Operation Plan
PRs.	-	Pakistan Rupees
RTDB	-	Research and Technology Development Branch
SISP	-	Second Irrigation Sector Project
SMB	-	System Management Branch
SMIP	-	Sunsari Morang Irrigation Project
STW	-	Shallow Tube Well
USD	-	United States Dollar
VDC/s	-	Village Development Committee/s
WRR	-	Water Resources Regulation
WUA/s	-	Water Users Association/s
WUG/s	-	Water Users Group/s

Adiyas	:	Sharecropper usually 50%
Amin/s	:	Surveyor/s
Assistant Chaudhary	:	Assistant in-charge of irrigation management
Badghar	:	Chief of village, usually elected by the villagers
Bahidar	:	Accountant
Bankas	:	A kind of grass to make rope
Batiyas	:	Sharecropper
Bhalmansa	:	Chief of the village, usually elected by the villagers
Bigha	:	Land measurement unit, one bigha is 0.6 ha
Choudhary	:	The Head
Choukidars	:	Guards
Desawar	:	General Assembly of the irrigation association
Dhariya	:	One labor contribution from a household having 4 or more manpower
Dobbar	:	Two times
Haat bazaar	:	Local market
Jhara	:	Labor mobilization
Jharali	:	During emergency, mobilization of double manpower
Jharulra	:	Number of labor mobilization in each day
Jimmuwal	:	Responsible person
Kalami	:	Land unit of 1.8 ha. One labor contribution per unit of this land
Khara	:	Penalty
Khasi	:	Castrated goat for meat purpose
Khola	:	River
Kulhara	:	Irrigator of a particular branch
Kulo	:	Canal
Lathi	:	7 1/2 feet long stick used for measurement
Lekhandaran	:	Secretary
Mahajhara	:	General mobilization of labor
Mahato	:	The Head of irrigation
Mamulate	:	Ordinary mobilization of labor
Mato muri	:	Land measurement, 80 mato muri makes one hectare
Mauja	:	Village
Maujane Khetara	:	Labor mobilization based on irrigated land within a village
Meth Mukhtiar	:	Chief irrigation supervisor
Muri	:	Unit of measurement, one muri paddy is 60 kg.
Nandarwa	:	Measurement man
Nath	:	Measurement unit
Paani Pot	:	Water tax
Paani Pradhan	:	Water chief
Paisa	:	$1/100^{th}$ of One NRs.
Palaha	:	Household having 3-4 able men has to contribute labor for 4 days continuously
Pan chirage	:	Messenger of the system
Panchayat	:	Village committee
Paani kar	:	Water tax
Phaduwa	:	Hoe
Pharwas	:	Picks
Ropani	:	$1/20^{th}$ of a Hectare
Sachib	:	Secretary
Site Jhara	:	Labor mobilization based on the whistle sound
Terai	:	Plain area

Executive Summary

This summary report presents a brief description and the findings of a study on the process and performance related to the mobilization of irrigation service fees in Nepal. Focusing on a number of selected irrigation systems in Nepal, the study covered issues relating to the efforts on irrigation service fee collection and the trends arising from such efforts. The study was conducted through interviews with key persons involved in policy and management of irrigation systems, and with selected farmer groups. Data from secondary sources supplemented this information. For the purpose of this study, Irrigation Service Fees refers in general, to fees paid by the water users, either in cash or kind, or a combination of both, for the irrigation services provided, irrespective of whether the provider is the government or a water users association. The term ISF is synonymous with many other terms used for this purpose, such as, water cess, irrigation fee, water charge, water tax, etc.

Mobilization and utilization of irrigation service fees is one of the most critical issues affecting productivity and sustainability of irrigated agriculture. The sources and ways of financing irrigation agricultural production are rarely discussed or analyzed fully before funding decisions are taken for irrigation infrastructure development in developing countries. The method of financing, the operation and maintenance of the developed infrastructure becomes an important issue only when government allocations for post-construction operation and maintenance activities are found to be inadequate. Until then the farmers are "beneficiaries" of the services that the government is expected to "provide". This is true of many irrigation systems in developing countries that are mainly built, operated and maintained by the government.

Nepal's agency-managed irrigation systems covering nearly a quarter of the country's total irrigated area typifies this situation. On an average, only about 2 percent of the total operation and maintenance expenditure in these systems is recovered from the farmers. However, the farmer-managed irrigation systems in Nepal, which account for nearly $3/4^{th}$ of the total irrigated area offer an interesting contrast. Some of the farmer-managed systems were built by the farmers themselves. However, all such systems are operated and maintained by the farmers without any support from the government. In the third category, the systems are managed by the farmers with some assistance from the government. Thus, the most interesting aspect of the subject of Irrigation Service Fees in Nepal, particularly from a research and policy perspective, is the co-existence of these three categories of irrigation systems with such contrasting features of resource mobilization processes.

The Government of Nepal introduced the concept of water charges in agency-managed irrigation systems in the 1950s, but the levy was institutionalized with statutory recognition very much later through the Canal, Electricity and Related Water Resources Act of 1967. The regulations under this Act were declared seven years later in 1974, after which the water tax (*paanipot*) assumed the status of a legally enforceable government tax. Starting with a meager amount of NRs. 9 per hectare per crop, the water tax was raised to NRs. 60/ha in 1975, and since then, the rate has remained the same in many irrigation systems. In some donor assisted large infrastructure development projects, higher rates, ranging from NRs 90/ha to NRs 400/ha, were introduced. The large systems are expected to charge a higher rate, but some of them still continue to charge the low rate of NRs. 60. For groundwater schemes, the water charge is higher than for surface water schemes. For instance, Bhairahwa Lumbini Ground Water Project, which charged NRs. 200 per ha in 1986, has now increased it to NRs. 400.

The idea of irrigation service fees is especially important in the case of farmer-managed irrigation systems. Although there is no water tax payable to the government, the farmers need to contribute directly to the operation and maintenance management of the physical system. The number of farmer-managed systems in Nepal is estimated to be about 1,700 units in the *Terai* and over 15,000 in the hills. Since each system has its own mechanism for resource mobilization, there is no fixed rate common to all farmer-managed irrigation systems. The operation and maintenance of these systems have to be supported by the farmers themselves, and therefore, resources mobilized by them for this purpose are substantially higher than what is normally levied as water tax from agency-managed irrigation systems. The study found that the hill systems in Nepal mobilize between NRs. 80-860 per hectare, and the *Terai* systems in the plain mobilize between NRs. 47-680 per ha, as compared to NRs. 60-100 fixed by the government in agency-managed schemes.

The success of farmer-managed irrigation systems in mobilizing irrigation service fees for the O&M of the system can be attributed to the following. One is related to the attitudinal posture imposed by collective behavior in the farmer-managed irrigation systems, and the other is the flexibility available for farmer-managed system farmers to mobilize resources in terms of a number of ways, such as materials, family labor, cash or as part of the harvest. Both these aspects are related to cultural elements of a communal approach to natural resources management.

The study has identified the dynamics of the functioning of farmer-managed systems, which are based on the tradition of common property resources management. Valuing water as "Community Property" belonging to a group becomes the organizing and unifying force for farmers in a given farmer-owned system. On a continuum ranging from anarchic to well-organized behavior, the non-compliance with rules for water acquisition, allocation and distribution, and resource mobilization results, which is the "anarchic" situation, can be changed to more systematic and equitable distribution of irrigation water, when individual interest is superceded by collective interest. In an well-organized system, irrigation-related tasks are performed collectively by the water users through individual behavior that is governed by group-agreements.

The transparency of collective decisions enables the farmer-managed irrigation systems to easily institutionalize the irrigation service-fee collection process. Secondly, resources being managed at the local level, (the resources mobilized are spent in the same system), helps the farmer-managed irrigation systems to be more accountable to its member farmers. In agency-managed systems, arrangements with respect to both of the above aspects are such that, it is more difficult to convince the farmers that they should shift from anarchic behavior to more organized and equitable resource use. The study finds the Pithuwa Irrigation System to be illustrative of a gainful transition from anarchic to organized behavior, when its agency management riddled with free-riding and disregard for equity was replaced by a more accountable system of management with the help of an irrigation organization. The water users association of Pithuwa system played an active role in internal resource mobilization to the amount of NRs. 3.6 million as a contribution to system rehabilitation.

The flexibility in the farmer-managed irrigation system's approach to mobilize irrigation service fees allows labor contribution to be a main source for operation and maintenance funding. Also, the need to mobilize labor for operation and maintenance activities in systems, such as Chhattis Mauja of Butwal, Rani, Jamara and Kulariya Irrigation systems of Kailali District and Karjahi Irrigation System of Dang District, has become the overriding factor for social organization. Similarly, smaller systems in the hills, such as Raj Kulo of Argeli, Thulo and Tallo Kulo of Chherlung of Palpa district, are basically operated and maintained through labor contributions mobilized by organized farmer groups. In the Chhattis Mauja irrigation system, about 60,000 labor-days were mobilized in 1983-84 for desilting the main canal and repairing the intake and diversion weir in the Tinau River. This was possible through an elaborate

mechanism of labor demarcation and work distribution determined by a commonly agreed system of internal rules.

The consistent self-reliance demonstrated by the farmer-managed irrigation systems and the increasing budgetary difficulties for continued subsidies in agency-managed irrigation systems resulted in a major policy shift in the 1990s. The National Irrigation Policy, with amendments in 1997, conceived the objective of promoting user-participation and cost sharing in the management of water resources. The 1992 Policy, reinforced by the Water Resources Act of 1992, envisages the transfer of most of the agency-managed irrigation systems within a reasonable period of time. The larger systems, which are difficult to be fully managed by farmer groups, would be converted to jointly-managed irrigation systems. Thus according to this policy, there could be only two types of irrigation management in Nepal: farmer-managed or jointly-managed.

The study also benefited from case studies conducted in seven irrigation systems. One of them is a system that had been given over to the farmers immediately after its infrastructure was completed, and two of them are fully farmer-managed. Two others are jointly-managed, whereas, other two had been transferred to farmers keeping the headwork under agency administration. The operation and maintenance costs in these systems varied from a low NRs. 117 per ha to a very high NRs. 1,782 per ha. An interesting variable in these case studies is the way in which irrigation service fee is assessed. These methods ranged from a flat rate per unit of irrigated land to a volumetric basis in which irrigation service was charged on the basis of water shares received.

The process and performance of irrigation service fee mobilization in Nepal raises three main issues. First is the validity of institutionalizing the irrigation service fees concept itself. Some argue that there should not be any irrigation service fee at all and water for agriculture should be made available free of charge. This argument emerges from a traditional belief that water should be treated as a free good, and is reinforced by the low recovery rate in the agency-managed systems compared to the high administrative cost of collection. However, it ceases to become a defendable argument in view of the substantial resources willingly spent by the farmers in farmer-managed irrigation systems. The second main issue is on the philosophy and the process of assessing irrigation service fee. Unless the basis of assessment and the way irrigation service fee is actually assessed are fair and acceptable to the majority of the group, the performance of irrigation service fee collection can become adversely affected. The farmer-managed irrigation systems use an assessment procedure, which is commonly agreed upon by the group and can be reviewed on a regular basis more easily. The agency-managed irrigation systems rely on assessments made by agency staff not directly accountable to the water users. The third, which is the most important issue, is the way in which ISF collections are actually used. In the case of agency-managed systems, the fees are collected by government functionaries and credited directly to revenue, thus making its actual use not very transparent. The allocations of funds for operation and maintenance or rehabilitation work are not necessarily related to these collections, and therefore, the farmers cannot see a corresponding effect of their contributions. In contrast, in the farmer-managed systems, collections or contributions are directly used in the respective systems themselves, which helps in improving the performance of irrigation service fee collection.

From this perspective, irrigation service fee process and performance can be considered to be valid criteria for management transfer policies. Interestingly, Nepal seems to offer these contrasting situations of both highly subsidized agency-managed schemes and satisfactorily financed farmer-managed systems, leaving little room for doubt regarding the advantage of a wider scale management transfer effort.

An additional issue that gains significance in the case of Nepal is the need to consider the operational status of the system just before it is transferred. Good physical condition prior to transfer would assist in establishing a smooth ISF process after the transfer. If the physical condition of the scheme is poor, prior

to transfer, the cost of rehabilitation required in many large agency-managed systems would place a severe burden on the farmer organization which takes over its operation and maintenance responsibility. Alternatively, if they were to start the post-transfer responsibility with assistance from the government, self-reliance may become a very distant and perhaps an unachievable goal.

The study included a brain storming session of a working group, in which about twenty participants at policy as well as implementation levels participated. The contributions made by the participants enabled the group to arrive at a common understanding of the issues related to irrigation service fees in Nepal. A workshop to discuss the preliminary findings of the ISF study was organized. At the brain storming meeting, the participants asserted that irrigation service fee should be treated as a "Service Fee" rather than a "Tax", which should account for the major part of the operation and maintenance costs, while alternative income sources, if any, should be used for enhancing the organization's funds. Another view was that government subsidies should not be for normal operation and maintenance expenditure, but at the same time they were, for practical reasons, against the recovery of capital costs through irrigation service fees. System based service fee rate assessment and collection mechanism was one of the other ideas presented at this meeting. Similarly, the workshop generated a number of ideas from the local community. On selected topics, different groups deliberated at length and provided valuable information on a number of issues.

The study also included a review of international experience with irrigation service fees. Many developing countries have similar problems in service fees collection. One major common problem is the difficulty imposed by the layout of the physical system to implement a "no pay – no water" irrigation service fee policy. The other common problem is regarding the accuracy of data of delivered services. Significant discrepancies in reported areas, costly and lengthy methods of fee collection, lack of incentives to the collectors are the main causes of inaccurate data. In Bangladesh, Pakistan, and Nepal, the collected fees are credited to the general government revenue, and are not related to the operation and maintenance budgets. Thus, the agency has no real incentive to increase collection efficiency. Likewise, farmers have no incentive to pay. In several countries, irrigation management transfer followed a change in water charges. In Indonesia, a reduction in government subsidies along with a management transfer led to an increase in water charges to farmers. In contrast, management transfer in India has led to more efficient pump use, and reduced the cost of water to farmers. Finally, the study arrived at the following key recommendations:

1. *Generating the required recurrent operation and maintenance costs must be a major concern in agency-managed schemes and Irrigation Service Fee should be the main source for financing such costs;*
2. *No government subsidies should be given on normal operation and maintenance expenses in agency-managed schemes;*
3. *Increases in water charges are possible and viable through committed management action, however, improved quality of service and equity in service delivery are pre-conditions for increasing the service fees and collection rates;*
4. *Irrigation Service Fee collection can be improved by decentralizing the responsibility of assessment and collection to the Water Users Associations;*
5. *For Water Users Associations to undertake this responsibility, their capacity need to be improved, and they should be given adequate legal authority;*
6. *To expedite the collection process, a proper incentive structure should be devised for both the farmers paying ISF and the persons involved in the task of collection;*
7. *Irrigation Service Fees should be treated as a service fee and not as a tax and the collections should be kept at the projects level and should not be deposited in the Consolidated Fund of the government;*
8. *There should be no capital cost recovery by the government;*

Chapter I

Introduction

This study on Irrigation Service Fees in Nepal is the outcome of ongoing efforts on the process and performance evaluation of management transfer programs in Nepal. These joint efforts are being made by the Research and Technology Development Branch (RTDB) of the Department of Irrigation (DOI), Nepal and International Water Management Institute (IWMI) with the financial assistance from the Ford Foundation. IWMI in collaboration with RTDB of DOI, Water Users Associations (WUAs) and other local institutions carried out this study from April to August 1998.

1.1 Preamble

Irrigation Service Fee (ISF) refers in general to fees paid by farmers or users for irrigation services. Nevertheless, other terms similar to ISF, such as water cess, irrigation fee, water charge, water tax, etc. are also used to denote fees paid by farmers for irrigation services. In Nepal, the irrigation service providers are either the DOI or the WUAs, or both in jointly managed irrigation systems (JMIS). The funds for irrigation services are obtained from ISF collections, government sponsored operation and maintenance (O&M) grants, or from any other revenue generating activity of farmers or WUAs.

ISF is charged from any community, public, or jointly-managed irrigation system, independent of whether it is a gravity fed, lift, or ground water scheme. These fees are collected in cash, kind, labor or in combinations depending on the agreements made between the beneficiaries and/or the agency. ISF is collected in cash in agency-managed irrigation systems (AMISs), and in cash, kind, and labor in farmer-managed irrigation systems (FMISs) or transferred systems. Collection mechanisms and purpose of collection of ISF vary from system to system depending on system characteristics or type of management.

Current irrigation policies, guided by the principle of local governance and beneficiary' participation in development endeavors, promote irrigation management by the beneficiaries' themselves. Accordingly, many irrigation systems that are currently managed by the agency are to be partially or fully transferred to farmer organizations, depending on the size or other management attributes. ISF is crucial to the WUAs that have either taken over or are in the process of taking over the management of these schemes, as they have to meet the cost of management using ISF funds. In jointly managed and management-transferred systems, it is vital that sufficient funds are generated by ISF. Otherwise, the quality of irrigation services would deteriorate Consequently, the timeliness, reliability and adequacy of irrigation water would be affected and any gains made by irrigation management transfer (IMT) would be nullified.

This ISF study has further significance in IMT cases, as it looks at the post-transfer impacts, particularly the self-reliance and sustainability of WUAs which would have a bearing on the irrigation services provided by the management. The study would assist in the formulation of appropriate policies and rules, regulations, and institutional support required for success. In order to make full or partial management transfer efforts fruitful, productive, and sustainable over time, it is necessary for all concerned to have an increased understanding of ISF rate fixation, collection, and its use under varying irrigation management attributes.

1.2 Objective

The main objective of this study is to analyze irrigation service fee collection in jointly managed and transferred systems and recommend measures that would lead to the improvement of benefits obtained from this fee. The study will provide ISF related information that could be useful for policy makers and WUAs in the respective systems.

1.3 Study Description

Some irrigation systems, particularly the FMISs, have been highly successful in collecting ISF. However many transferred systems are not generating sufficient resources from ISF. Examples of both types of schemes can be found within Nepal. It is proposed to study both successful FMISs and systems of comparable size from other countries to take lessons learned to other transferred (or to be transferred in future) irrigation systems of Nepal.

The present study on ISF comprises of four components:

1. Study of ISF collection efforts and trends, identification of key issues affecting policy and legislation relating to ISF and the financing of O&M costs.
2. Review of performance of ISF mobilization in selected AMISs and FMISs in Nepal and comparison with some international evidences;
3. Discussion and a one-day workshop on issues related to ISF with the participation of relevant officials and professionals on ISF issues, in order to build up a comprehensive understanding of the problem and arrive at solutions to address these problems.
4. Dissemination of findings and recommendations.

The following issues will be addressed in reviewing the performance of ISF mobilization in different irrigation systems:

- How are the fees determined?
- How are they collected?
- How are they utilized?
- What authority does WUA have for collecting fees?
- Irrigation Service Fee collection rates and amounts of ISF collection
- Strengths and weaknesses of adopted practices.
- Constraints and limitations.
- Basis for collection of arrears and dues and/or write off.

The following sample irrigation systems were selected for the study:

1. Aandhi Khola Irrigation System, Syangja – handed over to farmers following construction
2. Kankai Irrigation System – Jointly-managed
3. Marchwar Lift Irrigation System – management-transferred except the headworks
4. Nepal West Gandak Canal Irrigation System – management-transferred except the headworks
5. Bangeri Irrigation System, Bara – farmer-managed
6. Chhattis Mauja Irrigation System, Rupandehi – farmer-managed
7. Pithuwa Irrigation System, Chitwan – jointly-managed

Data were gathered from secondary sources and by visits to the respective systems. Key personnel, at policy level in the Ministry of Water Resources (MOWR) and DOI, at implementation level associated

with system management activities including the WUAs and selected beneficiary farmers, were interviewed. Checklists and semi-structured questionnaires were used for collecting data through interviews. A comparative assessment of the seven irrigation systems was made. The best practices were identified with a view to making recommendations relevant to jointly managed and transferred irrigation systems.

Chapter II

Irrigation Service Fee Collection in Nepal: A Review

This chapter elaborates on ISF collection efforts and trends that have been observed in the past.

2.1 Context of Irrigation Service Fee in Nepal

Irrigation development has been given priority in the planned development efforts of Nepal. Successive five-year plans have allocated an increasing proportion of development expenditure for irrigation (See Chart 2.2). With the continued increases in the irrigated area resulting from additional investments in the irrigation sector, the total O&M cost in AMIS has also been increasing.

The total area irrigated in Nepal is estimated at 1,091,000 ha. The irrigated area is categorized by the different management systems prevalent in Nepal in the following Table 2.1.

Table 2.1. Irrigated Area by Management Category in Nepal

Management Category	Area Irrigated (ha)	% of Total Irrigated Area
Agency Managed	245,500	22.5
Management- Transferred	21,500	2
Farmer-Managed	492,000	15.1
Agency-Assisted Farmer-Managed	332,000	30.4

Source: Based on a status paper presented by Dr. Sharma in INPIM seminar held in Chitwan, 1998

The proportions are depicted in Chart 2.1 below. Some of AMISs are as large as 66,000 (Sunsari Morang) ha and others are smaller units, as small as 50 ha (Aanpchaur). The management-transferred irrigation systems constitute four surface irrigation systems that have been declared as "transferred over to users" – Aandhi Khola (282 ha), West Gandak (9,000 ha), Panchkanya (406 ha), Marchwar Lift (2,815 ha). Similarly, some sixty deep tube wells covering about 6,000 ha have also been turned over to farmers. Beside these, some small irrigation systems have been transferred through Irrigation Line of Credit Program accounting for about 3,000 ha. Thus, the declared management-transferred irrigation systems cover about 21,500 ha, i.e. about 8% of the agency developed irrigated area (267,000 ha). Many other irrigation systems such as Gadkhar (105 ha), Pithuwa[1] (600), Sunsari Morang (66,000 ha), Kankai (7,000 ha), etc are under joint management and the management responsibilities are shared between farmers and the government agency.

[1] Though farmers are managing the entire system by themselves, the system is not yet declared as "management-transferred" and hence been considered as jointly-managed in the study.

2.1: Irrigated Area by Management Category

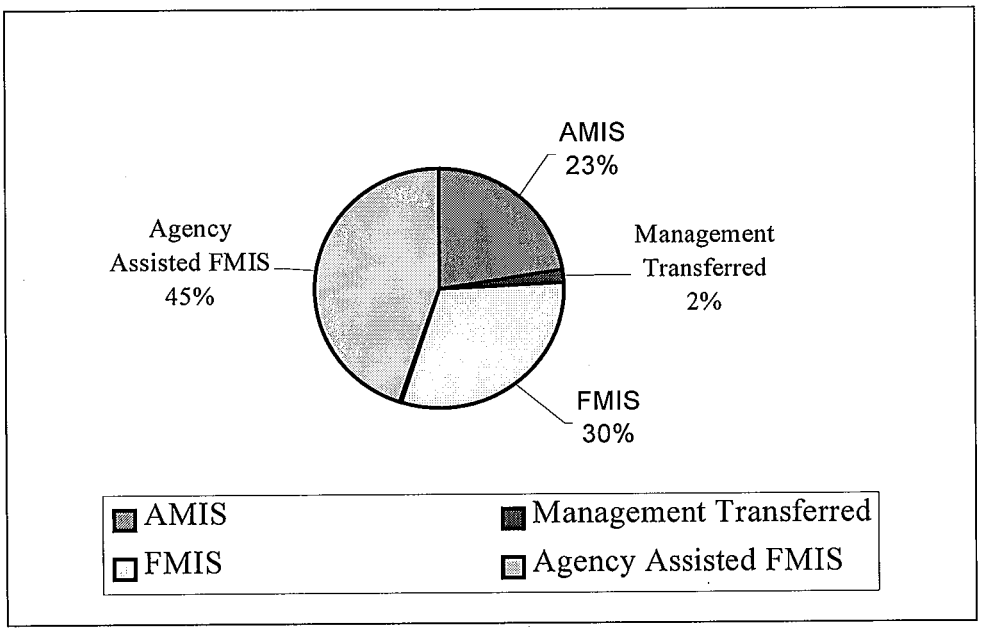
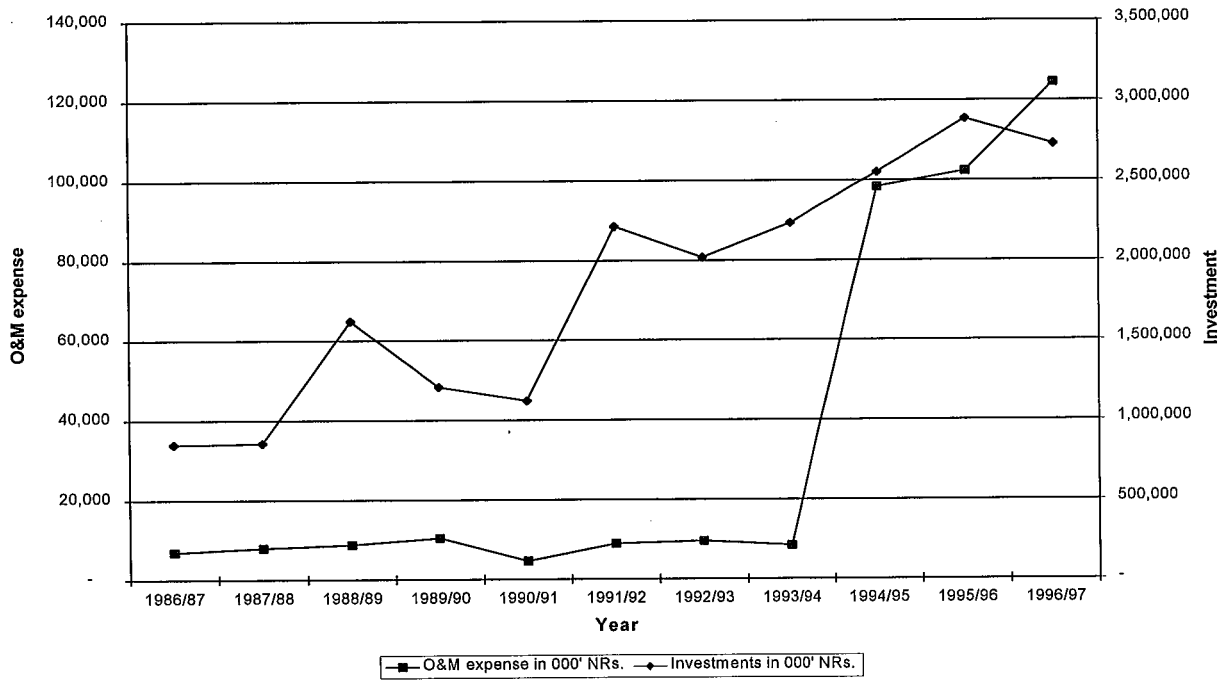


Chart 2.2: Recurrent O&M Expenditure and Investment in Irrigation



Source: Economic Survey of Nepal, 1998, Department of Irrigation

Three types of irrigation financing exist in Nepal. The first is full government financing where the government bears the entire development and recurrent O&M cost of irrigation and users are charged for irrigation services. This is the dominant form of public irrigation financing, as twenty three percent of irrigated area falls under this category. The second is cost sharing, where the irrigation development and management costs are shared between the farmer and government agency in varying proportions. There is no water charge collection in such systems. The third type is farmer-financed i.e. FMISs and O&M responsibility is borne entirely by the user/farmer .

O&M Cost Recovery

In Nepal, agriculture is a private sector activity. Hence, the responsibility of DOI is to provide irrigation services to the farmers. It does not control the agricultural activities of farmers. Land belongs to the farmers and there is no control over the irrigated land by the government. Investment in irrigation is considered a productive investment so there should be reasonable return for cost recovery of investment as well as the O&M costs. So far, majority of the investment on irrigation development in Nepal has been financed through external institutions like the World Bank, Asian Development Bank and other sources. Along with credit agreements, covenants for cost recovery on investment were also signed between the funding agency and the recipient of the loan.

The World Bank's policy on cost recovery was ambiguous before 1976. It was stated that there should be recovery of project cost from beneficiaries. For irrigation projects in particular, there was a requirement that the irrigation authorities should recover at least the O&M cost to the extent practicable.

Loan covenants in the Bank-financed irrigation projects require that the borrowers collect the fees from beneficiaries of the irrigation systems. The O&M cost recovered should be sufficient to operate and maintain the irrigation systems. ISF is a direct method of mobilizing resources for O&M from the irrigators.

However, O&M cost recovery through ISF has been below target in Nepal. The shortfall in mobilization of ISF funds is attributed to the following:

a) Lukewarm government commitment
b) Unreliable water supply due to poor O&M of irrigation systems
c) ISF considered as a burden by the irrigators.
d) Projects have failed to generate full benefit to the farmers at the early stage,
e) Farmers have been using water freely and not paying water fee, and
f) Inadequate institutional mechanism for administering fee collection .

The government has been concerned about poor cost recovery through ISF collection The cost recovery is even more relevant due to the government's promotion of:

- Privatization and structural adjustment of the economy
- Sustainability of the irrigation systems

Privatization and Structural Adjustment of the Economy

The role of the government has changed from being the direct actor to the facilitator for the promotion of creativity and initiative by the users themselves. The same principle is being applied in the management of the already completed irrigation systems. The privatization of services envisages the reduction of the subsidies provided by the government for O&M so that those resources can be utilized in other important

sectors. Hence, the privatization of services in the irrigation sector envisages the promotion of beneficiary participation in the AMISs through management transfer of the systems or through promotion of the joint-management and partial management transfer to the beneficiary farmers. The privatization policy of the government has also been the motivating force to give serious consideration to finding alternatives to meet the gap between O&M cost requirement and ISF collection.

Sustainability of Irrigation Systems

Sustainability of irrigation systems depends not only on physical conditions but also on socio-institutional and economic conditions prevalent in the system. There should be opportunity for the farmers to make agriculture a profitable economic and self-reliant enterprise. It is necessary to foster a conducive environment for self-sustaining economic and institutional development. Institutional development includes the establishment of properly functioning WUAs.

WUAs can undertake the following activities in support of sustainable irrigation management (Gavin Wall, 1997):

a) Raise capital for works, which may reduce environmental threats
b) Organize and support extension activities to raise awareness of sustainability and of effective changes, which may decrease environmental threat,
c) Foster education, training and technical assistance program,
d) Act as political lobby group to represent users' view,
e) Adopt appropriate means for maintenance to ensure that water use efficiency does not decline due to lack of maintenance.

Currently, the emphasis is on cost recovery for O&M in externally funded irrigation projects. Cost recovery through ISF falls in line with the recently enunciated government policy of privatization and structural adjustment of the economy and sustainability of the irrigation systems from the economic as well as institutional perspectives. These issues have become more pertinent due to the changing role of the government from one of active participant to that of a facilitator in the different domains of economic development of Nepal.

2.2 History of Water Charge Collection

In the systems fully financed by the government, water charges were introduced in the 1950s but the charges were institutionalized and given statutory recognition only in 1967. The Canal, Electricity and related Water Resources Act of 1967 provided a legal basis for water charges to be collected from users of the public works for surface and tube well irrigation. In 1974, the Canal Operation Regulation under the authority of Canal, Electricity and related Water Resources Act, 1967 was gazetted authorizing water tax collection as a source of government revenue, with provision for punishment of defaulters. Hence, water tax (*paanipot*) obtained the status of a government tax. Until 1975, the water charge was NRs. 9 per hectare per crop. It was raised to NRs. 60/ha in 1975. Since then, the rate has remained the same in many irrigation systems except in some Board-managed irrigation systems[2].

The present water charge is NRs. 60/ha/crop in most surface irrigation systems. This is equivalent to NRs. 90 per ha per year at the present cropping intensity of 150 percent. Recently a few large donor-assisted projects such as Narayani and Sunsari Morang irrigation projects have introduced higher rates. Sunsari-

[2] Irrigation systems that are under the management of a Board consisting of representatives from different agencies directly under the Ministry of Water Resources. Such arrangement is expected to facilitate more efficient decision-making as against the usual bureaucratic process in other irrigation systems managed through the Department of Irrigation.

Morang has fixed ISF at NRs. 400. Most of the large systems are supposed to adopt the higher rate but some systems like Narayani Lift in Chitwan retained the low rate of NRs. 60.

The water charge for ground water irrigation is higher. The rate in Bhairahwa Lumbini Ground Water Project was NRs. 200 in 1986. At present, it has increased it to NRs. 400. Differential ISF rates in some irrigation systems are tabulated below.

Table 2.2. Rates of Irrigation Service Fee in Nepal

Name of the system	Rate (NRs / ha)	Basis of Assessment
Kankai (Surface water)	100	area under rice
Narayani Zone (Surface water)	100	area
Sunsari – Morang (Surface water)	400	area
Chitwan Lift (Surface water)	60	area
Bhairahwa Lumbini (Groundwater)	400	volume
West Gandak (Surface water)	60	area
Khageri (Surface water)	60	area
Panchkanya (Surface water)	90	area
Mahakali (Surface water)	136	area

Source: Department of Irrigation, 1998

The ISF is considered as a tax solely for the purpose of recovery of O&M cost . The water tax is collected on the basis of the irrigated area, not on the basis of the volume of water used in surface irrigation systems. The tax is the same for all crops. In some pump irrigation systems, water charge is based on the period of operation of the pump. The water charge thus collected is deposited in the Consolidated Fund of the Government of Nepal. The Finance Ministry allocates the O&M budget for each system each year.

Farmers of FMISs do not pay a separate water tax to the government. However, they have to contribute directly for the O&M of the scheme each year. There is no single rate in the case of FMISs each system has its own mechanism for internal and external resource mobilization.

The major problem with the collection of water charge has been difficulty in obtaining payments on a regular basis. During the 1980s, the water tax was conceived as a service fee to be paid by the users of the irrigation facility. Hence, the Government of Nepal decided that ISF should be collected either by the relevant irrigation system or irrigation project authorities instead of the Land Revenue Office. Prior to this, water charges were collected along with land revenue. Subsequently , the government decided that water charge should be collected by irrigation projects as a service charge, from the users of the irrigation facilities. In government operated irrigation systems, water charges were collected and deposited in the Consolidated Fund of the Government. Over a period of time, it was found that water charges were paid only during land transactions. This was because, transfer of land ownership required that all government dues, including water charges, be paid fully , for the transaction to be completed.

In the 1990s, several important policies were announced with the objective of promoting user-participation and cost sharing by the beneficiaries. The National Irrigation Policy and Management Transfer Program relating to agency-managed systems was an important milestone in this respect.

National Irrigation Policy

The Irrigation Policy of 1992 and subsequent amendments in 1997 are the landmarks of changes in Nepal's irrigation sector. One of the objectives of National Irrigation Policy of 1992 was to decrease the

government's direct involvement in the construction and O&M of irrigation systems. This policy visualizes only two types of irrigation management in Nepal. They are FMISs and JMISs. In the hill area, irrigation systems with less than 500 ha and in the terai, systems with less than 2,000 ha *i* were to be transferred to the beneficiaries and managed by the WUAs. The bigger systems would be under the joint management of the agency and the WUAs. Under such arrangement, the water charge would be collected by WUAs and collection shared between the agency and WUAs based on the division of work agreed between the WUAs and the agency. The ratios of cost sharing are provided in the National Irrigation Policy. The Water Resources Act, 1992, has reinforced the basic principles propagated by the National Irrigation Policy. The Water Resources Act and Regulation have made provisions for the water fee collection.

Management Transfer Program

The management Transfer Program initiated in 1992/93, proposed a gradual transfer of management responsibility to the user farmers. Under these conditions , it would be possible to get a larger number of actors, including farmers, DOI and consultants (Satyal, 1996) to participate in the process. Several pilot projects were implemented in order to test the process of management transfer. This program has begun to yield positive results (Khanal, 1997; Mishra and Molden, 1995). In some systems, the beneficiaries have taken the initiative in meeting a certain percentage of O&M cost through internal resource mobilization.

2.3 Administrative Procedures for ISF Collection

A simple mechanism has been established for water charge collection in many irrigation systems. A few *Amins* (Surveyors) are assigned this job of water charge collection. In some systems, water users committees were formed to improve water charge collection. There is also an agreement that water users committee would be given a certain percentage of water charge collection for the improvement of the tertiary canals in the committee's jurisdiction. However, all collections should initially be deposited in the Consolidated Fund of His Majesty's Government. Unless it is allocated in the budget of the government, water users' committee cannot obtain t its share of the collection.

i. Identification of individuals who must pay water charges:

Water charges are levied only in government-operated irrigation systems. There is no problem in identifying who should pay the water charges when the land is owner-operated. In the case of tiller-operated lands, there is a controversy regarding who should pay the water charges. The practice is that the landowners pay the water charge for the main crop and the tenants pay the water charge for the second crop. In many districts of Nepal, land rent has already been fixed. In such a case, the landowner is entitled to get a fixed amount of rent on the main crop. The tiller gets more benefit out of the irrigation facility, so the landowners want the tillers to pay the water charge. In the case of sharecropping, both the owners as well as the sharecroppers, share the costs of water charge between them. Legally, it is the landowner that has to pay water charges.

ii. Determination of the amounts to be paid:

Every season, a surveyor determines whose land has been irrigated within the surface irrigation system for that season. In the case of pump irrigation systems, the farmer who needs water applies for the pump irrigation office and water charges collected according to his requirement. The farmer is not allowed to receive water for the next season, until the previous dues are paid, so it is easy to determine water charges

in the case of the pump irrigation systems. However, it is difficult to implement this provision during canal operation.

iii. Billing procedures:

In the AMISs, a surveyor notifies the landowner how much land has been under irrigation in a particular season. This notification is made at the relevant village development committee office and the notice would also be pinned on the project office notice board. Bills are not given to individuals. Farmers are required to pay the due amount to the accountant stationed at each office, on the basis of this notice. .

iv. Collection procedures:

Until 1982, water charge was collected by the District Unit of the Land Revenue Department or in a few instances by the irrigation project. The government subsequently decided that water charge collection should be done by the relevant irrigation project. Water charge collection units were established in all government irrigation projects, and the collection became the responsibility of these units. The collection was deposited in the Consolidated Fund of the Government and not retained in the project. This procedure has remained unchanged up to the present. . However, the collection rates differ from project to project.

v. Enforcement procedures:

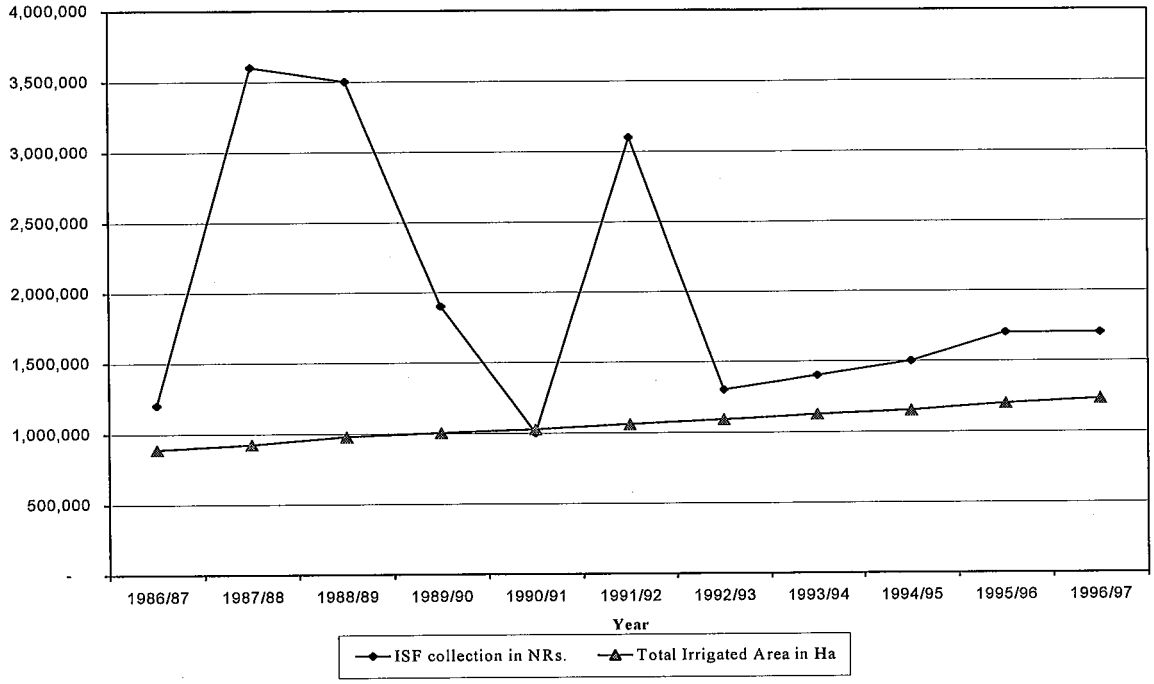
The government has set differential rates of water charges for government managed irrigation systems. Water charges are considered as government revenue. The defaulters are subject to punishment. In the case of non-payment of land tax , the land of the defaulter can be auctioned to realize the dues. However, there is no legal basis for applying such enforcement procedures for defaulters of water charges. This is one of the causes for a significant short fall in water charge collections.

2.4 Irrigation Service Fee Collection Trend

The ISF collection has not been encouraging. In analyzing the government budget and estimates made for water charge collection, it is found that the government has lowered the estimates of water charge collection almost every year from fiscal year 1977/78 to fiscal year 1983/84. In 1977, the budget estimate for water charge collection was NRs. 6.5 million but the actual collection was only about NRs. 1 million. In subsequent years, the estimates in the budgets were lower, although with the increase of irrigation facilities in the area, the estimates and actual collections should have increased proportionately. From Fiscal Year 1977/78 to 1983/84, despite the claims of the government about the increased coverage with irrigation, water charge collection has remained at around NRs. one million for the last seven years[3]. In 1996/97, water charge collection was around NRs. 1.7 million. Water charge collection has not increased in proportion to the added irrigation facility. A graphical presentation of cumulative added irrigation facility over the years and corresponding ISF collection (based on the Ministry of Finance document) is given below.

[3] Detailed information on ISF collection is not available for many projects. Also, a separate unit for water charge collection is not established in all of them. So it is difficult to get the information about the administrative cost of water charge collection. Often, it is expressed that the administration costs for collecting the nominal ISF exceeds the total collection in many of the irrigation systems under DOI.

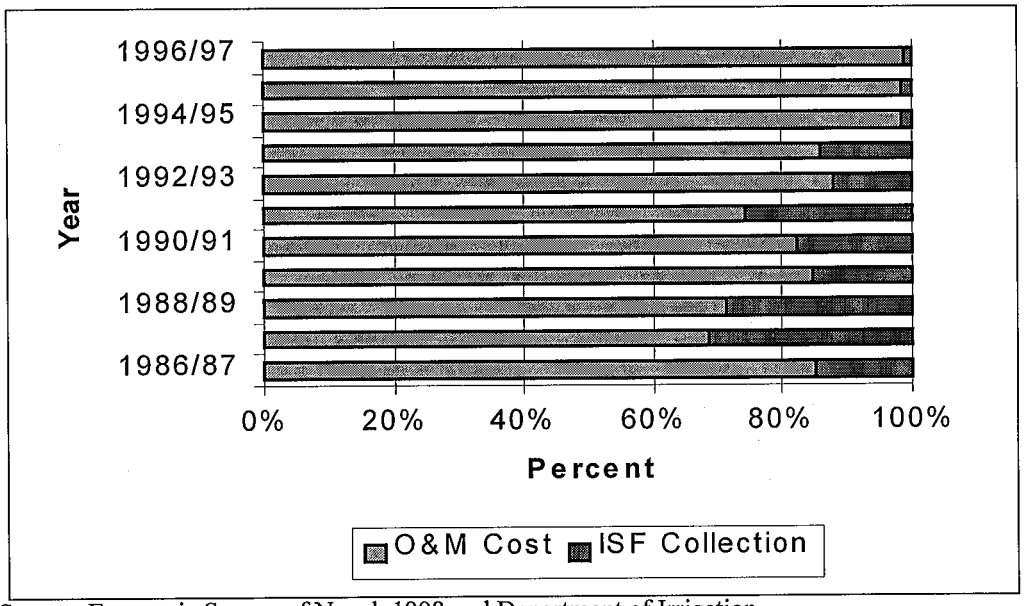
Chart 2.3: Added Irrigation Facility and ISF Collection in Nepal



Source: Economic Survey of Nepal, 1998 and Department of Irrigation.

Similarly, the trend of ISF collection as against the O&M costs is shown below (Please, see table 2.3, 2.4, and 2.5 for some system wise details).

Chart 2.4: ISF Collection as a Percentage of Total O&M Cost in AMIS in Nepal



Source: Economic Survey of Nepal, 1998 and Department of Irrigation

As seen from the above chart, there exits a wide gap between the O&M costs and the ISF collection. Also, the proportion of ISF collection with respect to the O&M costs is decreasing with time. This is also substantiated by a study undertaken in 1994 by the National Planning Commission on the O&M requirement and water charge collection which indicated that there has been only 2 percent coverage of O&M by water charge collection in Nepal. Hence, 98 percent of O&M cost is borne by the Government of Nepal in the form of subsidies (NPC, 1994). Also, a recent study of 25 irrigation systems on the relationship between O&M cost and ISF collection, shows that the contribution made by ISF towards O&M cost is only 2%.. This deficient scenario exists despite different endeavors of revising water charges and fixing differential rates for different irrigation systems in the course of time.

In 1997, the Accounts Committee of the Parliament of Nepal has pointed out that over NRs. 15 million is yet to be realized as ISF dues. It was also pointed out that the defaulters have been mainly the capital-intensive major irrigation projects. However, Mahakali Irrigation Project, despite being still under development, has shown reasonable improvements in collection. (Please, see Table 2.2 below).

Table 2.3 Mahakali Irrigation Project - O&M Cost and ISF Collection

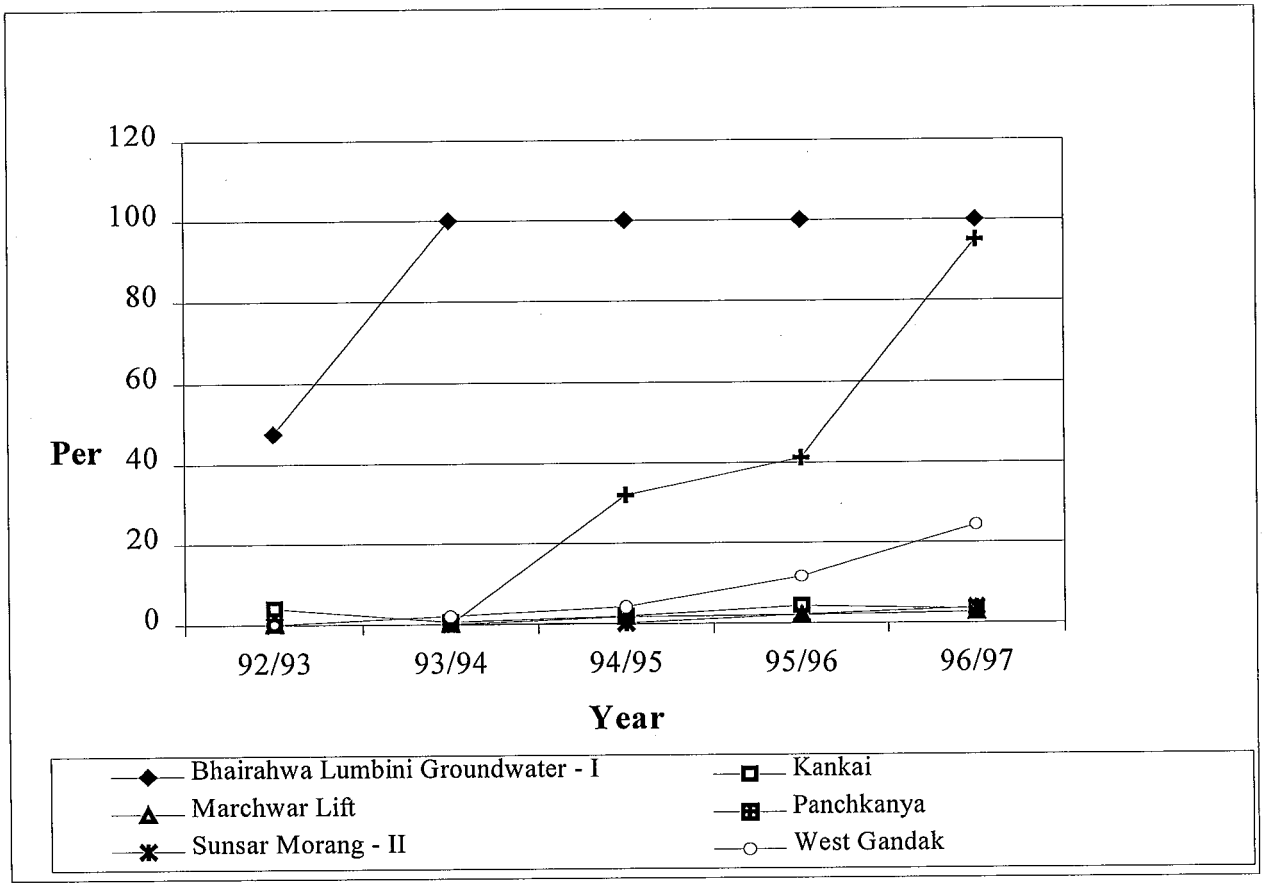
Year	O&M cost Million NRs.	ISF collection NRs.	% of Assessed ISF	% of O&M
1988/89	1.60	405,547	62	25
1989/90	2.00	367,627	55	18
1990/91	2.50	370,491	56	15
1991/92	7.20	344,817	52	4.7
1992/93	4.40	454,742	69	10
1993/94	3.29	616,701	94	18
Average	3.49	-	64	15

Source: CMS 1996. Rapid appraisal of Mahakali Irrigation Project, Kathmandu: CMS

The command area of Mahakali was 4,800 ha at stage I. The ISF rate was fixed at NRs. 136/ha. The WUAs that have helped to mobilize the ISF and WUAs are entitled to 25% of the collection. However, the total collection would be first deposited in the Consolidated Fund of the Government. The allocation of 25% to WUA would be made when the budget of the government is formulated .. The overall ISF collection in Mahakali during 93/94 period was encouraging. The farmers, besides paying the water fee also contributed labor for the maintenance of the tertiary canal.

The increasing trend of water charge collection can be observed specially in schemes under IMT programs. This trend is upward after 1993 when a program of IMT through a process of joint management began.. In some systems, even the rate of water charge has been increased to meet the O&M cost. The trends of resource mobilization in selected six such systems are shown below.

Chart 2.5: Percentage of Resource Mobilization with respect to O&M Cost in Selected Irrigation Systems



Source: Performance Measures Study, IIMI, 1998a

Table 2.4: Operation and Maintenance Projects of DOI - O&M Budget[4] and ISF Collections

S. N.	Irrigation Systems	Command[5] Area (Ha)	O&M Budget[6] (1000 NRs.)					ISF collection ('000 NRs.)				O&M Budget NRs/ Ha						
			98/99	97/98	96/97	95/96	Avg.	96/97	95/96	94/95	Avg.	98/99	97/98	96/97	95/96	Avg.	Max	Min
1	Kankai	8000	5013	3638	7170	5617	5360	238	295	182	238	626.6	455	896	702	670	896	455
2	Sunsari Morang	66000	13460	21975	15590	5285	14078	788	880	49	572	204	333	236	80	213	333	80
3	Chandra Canal	10500	1158	2712	1665	2120	1914	78	d.n.	d.n.	78	110	258	159	202	182	258	110
4	Koshi Pump	25000	24845	22823	22835	18715	22305	d.n.	11	d.n.	11	994	913	913	749	892	994	749
5	Sagarmatha Nalkup	700	2128	1528	1455	1281	1598	0	0	0	0	3040	2183	2079	1830	2283	3040	1830
6	Kamala	25000	6603	8363	7459	4916	6835	26	d.n.	d.n.	26	264	335	298	197	273	335	197
7	Mahottary Nalkup	1000	2313	1613	1973	1563	1866	0	0	0	0	2313	1613	1973	1563	1866	2313	1563
8	Manusmara	5200	1140	1649	1175	1162	1282	12	d.n.	d.n.	12	219	317	226	223	246	317	219
9	Jhanjh	2000	300	490	200	200	298	0	0	0	0	150	245	100	100	149	245	100
10	Narayani	28700	20873	19520	27793	25225	23353	0	0	0	0	727	680	968	879	814	968	680
11	Narayani tube well	2800	4660	4383	4603	4140	4447	d.n.	75	d.n.	75	1664	1565	1644	1479	1588	1664	1479
12	Narayani lift	4700	16756	15617	15955	17866	16549	d.n.	143	d.n.	143	3565	3323	3395	3801	3521	3801	3323
13	West Gandak	10300	2215	4138	1528	1319	2300	178	111	99	129	215	402	148	128	223	402	128
14	Bulingtar	240	190	136	230	124	170	d.n.	d.n.	d.n.	d.n.	792	567	958	517	708	958	517
15	Kapilbastu Nalkup	200	2668	1648	1816	1397	1882	0	0	0	0	13340	8240	9080	6985	9411	13340	6985
16	Banganga	6200	1248	1709	1770	2173	1725	d.n.	d.n.	d.n.	d.n.	201	276	285	350	278	350	201
17	Dunduwa	1250	480	371	311	244	352	d.n.	67	d.n.	67	384	297	249	195	281	384	195
18	Mohana + Pathraiya	4000	957	1105	900	889	963	0	0	0	0	239	276	225	222	241	276	222
19	Kailali + Kanchanpur tube well	556	1011	928	958	810	927	0	0	0	0	1818	1669	1723	1457	1667	1818	1457
20	Chaurjahari	600	493	345	690	594	531	0	0	0	0	822	575	1150	990	884	1150	575
21	Rampur Phant	755	684	557	3270	2508	1755	0	0	0	0	906	738	4331	3322	2324	4331	738
22	Aanpchaur Coffee	50	55	40	265	114	119	d.n.	d.n.	d.n.	d.n.	1100	800	5300	2280	2370	5300	800
23	Phalebas + Gyadi	440	300	211	690	533	434	0	0	0	0	682	480	1568	1211	985	1568	480
24	Pokhara Jalupayog + Hemja + Phewa	1680	1155	814	2465	2625	1765	0	0	0	0	688	485	1467	1563	1050	1563	485
25	Bijaypur + Begnas	1860	1268	897	1643	1482	1323	0	0	0	0	682	482	883	797	711	883	482
Total		**207731**	**111973**	**117210**	**124409**	**102902**	**114124**	**1320**	**1582**	**330**	**1352**							
O&M budget/ha			**539**	**564**	**599**	**495**	**549**											

d.n. – Data not available

Source: Department of Irrigation, 1998

4 As the whole budget is fully spent, it can reasonably be taken as the real expenditure for analysis purpose.

5 As recorded by DOI.

6 Excluded budgets for Material Testing, Mechanical Workshop, M&E, and Emergency Works.

Table 2.5: Operation & Maintenance and Irrigation Service Fees -by Type of Scheme

.	Irrigation System	Command Area (Ha ?)	O&M Budget (NRs '000)					ISF collection (NRS '000)			
			98/99	97/98	96/97	95/96	Avg.	96/97	95/96	94/95	Avg.
Surface Irrigation Schemes:											
1	Kankai	8000	5013	3638	7170	5617	5360	238	295	182	238
2	Sunsari Morang	66000	13460	21975	15590	5285	14078	788	880	49	572
3	Chandra Canal	10500	1158	2712	1665	2120	1914	78	d.n.	d.n.	78
4	Kamala	25000	6603	8363	7459	4916	6835	26	d.n.	d.n.	26
5	Manusmara	5200	1140	1649	1175	1162	1282	12	d.n.	d.n.	12
6	Jhanjh	2000	300	490	200	200	298	0	0	0	0
7	Narayani	28700	20873	19520	27793	25225	23353	0	0	0	0
8	West Gandak	10300	2215	4138	1528	1319	2300	178	111	99	129
9	Bulingtar	240	190	136	230	124	170	d.n.	d.n.	d.n.	d.n.
10	Banganga	6200	1248	1709	1770	2173	1725	d.n.	d.n.	d.n.	d.n.
11	Dunduwa	1250	480	371	311	244	352	d.n.	67	d.n.	67
12	Mohana + Pathraiya	4000	957	1105	900	889	963	0	0	0	0
13	Chaurjahari	600	493	345	690	594	531	0	0	0	0
14	Rampur Phant	755	684	557	3270	2508	1755	0	0	0	0
15	Aanpchaur Coffee	50	55	40	265	114	119	d.n.	d.n.	d.n.	d.n.
16	Phalebas + Gyadi	440	300	211	690	533	434	0	0	0	0
17	Pokhara Jalupayog + Hemja + Phewa	1680	1155	814	2465	2625	1765	0	0	0	0
18	Bijaypur + Begnas	1860	1268	897	1643	1482	1323	0	0	0	0
Subtotal		172775	57592	68670	74814	57130	64552	1320	1353	330	1123
Lift Irrigation Schemes											
1	Koshi Pump	25000	24845	22823	22835	18715	22305	d.n.	11	d.n.	11
2	Narayani lift	4700	16756	15617	15955	17866	16549	d.n.	143	d.n.	143
Subtotal		29700	41601	38440	38790	36581	38853	0	154	0	154
Groundwater Irrigation Schemes:											
1	Sagarmatha Nalkup	700	2128	1528	1455	1281	1598	0	0	0	0
2	Mahottary Nalkup	1000	2313	1613	1973	1563	1866	0	0	0	0
3	Narayani tube well	2800	4660	4383	4603	4140	4447	d.n.	75	d.n.	75
4	Kapilbastu Nalkup	200	2668	1648	1816	1397	1882	0	0	0	0
5	Kailali + Kanchanpur tube well	556	1011	928	958	810	927	0	0	0	0
Subtotal		5256	12780	10100	10805	9191	10719	0	75	0	75

Source: Department of Irrigation, 1998

d.n. – Data not available

The average O&M budget for surface schemes was NRs. 374/ha and ISF collection NRs. 65/ha

The average O&M budget for lift schemes was NRs. 1308/ha and ISF collection NRs. 52/ha

The average O&M budget for groundwater schemes was NRs.2039/ha and ISF collection NRs.143/ha

Table 2.6: Operation & Maintenance Budget Compared to Irrigation Service Fee

..	Irrigation Systems	Command Area (Ha)	Avg. O&M budget (NRs '000)	O&M Budget (NRs./ha)	Avg. ISF Collection (NRs '000)	ISF Collection (NRs./ha)	Total ISF/Total O&M Percent
1	Kankai	8000	5360	670	238	30	4.45
2	Sunsari Morang	66000	14078	213	572	9	4.07
3	Chandra Canal	10500	1914	182	78	7	4.08
4	Koshi Pump	25000	22305	892	11	0	0.05
5	Sagarmatha Nalkup	700	1598	2283	0	0	0.00
6	Kamala	25000	6835	273	26	1	0.38
7	Mahottary Nalkup	1000	1866	1866	0	0	0.00
8	Manusmara	5200	1282	246	12	2	0.94
9	Jhanjh	2000	298	149	0	0	0.00
10	Narayani	28700	23353	814	0	0	0.00
11	Narayani tube well	2800	4447	1588	75	27	1.69
12	Narayani lift	4700	16549	3521	143	30	0.86
13	West Gandak	10300	2300	223	129	13	5.62
14	Bulingtar	240	170	708	d.n.	d.n.	d.n.
15	Kapilbastu Nalkup	200	1882	9411	0	0	0.00
16	Banganga	6200	1725	278	d.n.	d.n.	d.n.
17	Dunduwa	1250	352	281	67	54	19.06
18	Mohana + Pathraiya	4000	963	241	0	0	0.00
19	Kailali + Kanchanpur tube well	556	927	1667	0	0	0.00
20	Chaurjahari	600	531	884	0	0	0.00
21	Rampur Phant	755	1755	2324	0	0	0.00
22	Aanpchaur Coffee	50	119	2370	d.n.	d.n.	d.n.
23	Phalebas + Gyadi	440	434	985	0	0	0.00
24	Pokhara Jalupayog + Hemja + Phewa	1680	1765	1050	0	0	0.00
25	Bijaypur + Begnas	1860	1323	711	0	0	0.00
Total		**207731**	**4565**	**1353**	**61**	**8**	**2**

Source: Department of Irrigation, 1998
d.n. – Data not available

Non-ISF Resource Mobilization

After the Irrigation Management Transfer program, efforts are being made by WUAs in a number of irrigation systems to mobilize non-ISF resources from within the systems. At present, such practices are seen in Khageri, West Gandak, and Marchwar systems. These non-ISF contributions include Agricultural Input Corporation's dealership, Bank's interest, equipment rental income, tree management, *haat bazaar* (local market) management, canal road toll, fishing and grass selling, etc. However, in some systems the amount thus collected is only nominal , in others like West Gandak, such resources are substantial.

Operation and Maintenance Budget

i. Sources of Revenue Available to Agencies Responsible for O&M:

The government-operated irrigation systems are provided with a budgetary allocation for O&M from the Ministry of Finance. Apart from this , farmers' participation in the tertiary canals could yield additional resources to the system for O&M activities. However, there are certain constraints. First, farmers' participation in such activities in government-operated systems has not been encouraging. Secondly, water charges collected in these systems have to be deposited in the Consolidated Fund and cannot be directly used for the improvement of the system.

Government-operated irrigation systems do not have financial autonomy. They have to operate within the financial regulations of the government regarding expenditure, procurement and contractual arrangements.

ii. Budget Procedures for O&M Fund Allocation:

No standard O&M budget allocation procedure exists in AMISs. O&M budgets are usually allocated by rule of thumb. It varies from about NRs. 9,400/ha in the system like Kapilbastu tube wells to NRs. 150/ha in Jhanjh. However, O&M budget allocation figures tend to be the same as that of previous year in the same system. The project/system estimates O&M requirements and the tentative cost is sent to DOI,which then collects such budget requirements from all projects. With the approval of the Ministry of Water Resources, the DOI submits the proposed O&M budget to the Ministry of Finance. The Ministry of Finance decides on the allocation for each project.

iii. Breakdown of the O&M Budget:

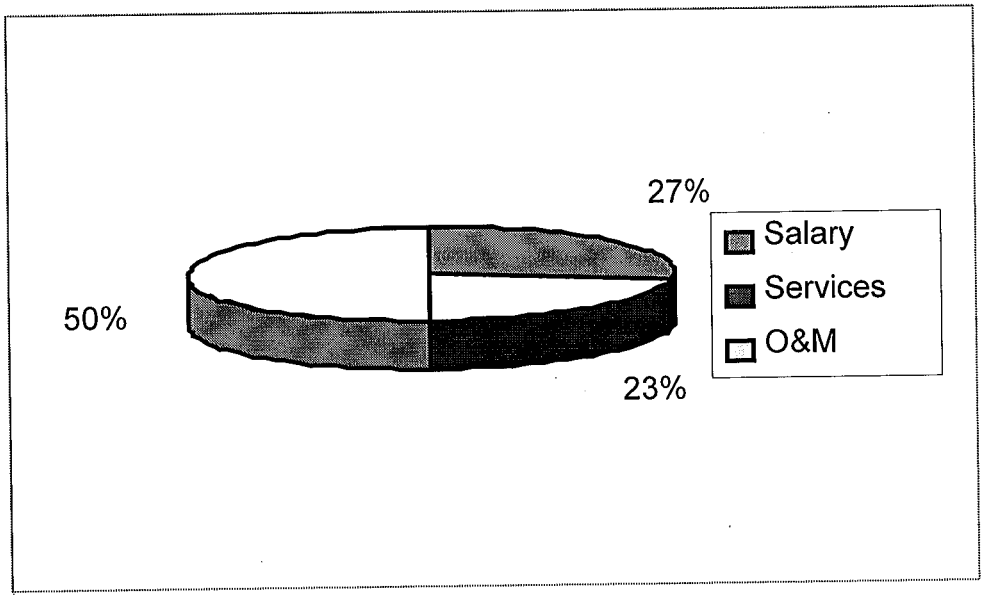
The breakdown of proposed O&M budget estimate for 1998/99 (2055/56) is given in Table 2.7 below.

Table 2.7: Breakdown of National O&M Allocation for the Fiscal Year 1998/99

Items	Salary and Allowances in '000 NRs.	Services in '000 NRs.	O&M in '000 NRs.	Total Budget Allocation in '000 NRs.
Allocation	33939	28498	62565	125,000
Percentage of budget allocation	27%	23%	50%	100%

Source: Department of Irrigation, 1998

Chart 2.6: Breakdown of Proposed Budget Items for O&M in 1998/99



As seen above, about 50% of the O&M budget is allocated to salary, allowances and services and 50% comes to O&M.

Chapter III

Mechanism for Generating Resources in Farmer Managed Irrigation Systems for Operation and Maintenance in Nepal

For comparative purposes, this chapter analyses the process and status of resource mobilization in FMISs in Nepal. The analysis tries to draw some lessons regarding the working of the f FMISs with regard to resource mobilization. The rules and regulations, which have evolved over a period of time to mobilize resources for O&M, can be considered to be the foundation on which the organizations have raised resources . Procedure for resource mobilization along with the rules and regulations for resource mobilization is discussed in this chapter.

3.1 Background of FMISs with Emphasis on Resource Mobilization

Nepalese farmers have recognized the importance of water resources for centuries. They have been constructing irrigation systems at their own expense to increase agricultural production, and have continued to do so for many years. This traditional farmer managed system is found scattered across Nepal. These systems have developed their own rules, norms and procedures of management.

Farmers are responsible for all management activities, including water acquisition from the source to delivery to the field, in the FMISs. Resource mobilization and management of resources for O&M are also the responsibility of farmers. In most systems, the extent of resource mobilization requirements for O&M has influenced the structure of the organization.

It is estimated that there are about 1,700 farmer managed irrigation units in the Terai and over 15,000 systems in the hills of Nepal (Pradhan, 1989) These systems have been contributing significantly to the food security system of Nepal. Despite the pressures of changes in the environment, landslides, and deforestation, many systems have made some incremental improvements and only a few have fallen into disuse. The Government of Nepal has been providing assistance to selected FMISs each year to improve productivity . Farmers have developed their own irrigation systems taking into consideration geographical impediments and limited provision of services from the government in the past. They have managed these systems by adjusting their operation to the nature of the soils, climate, topography and social structure of the particular location over the years. The varying environmental conditions have contributed to the development of different patterns of irrigation organization in Nepal. Distinctively different organizational patterns and various decision making patterns have developed for well defined tasks such as, water acquisition, allocation, and distribution, methods of system O&M, conflict management, communication, and resource mobilization.. The various organization patterns also reflect the physical type of irrigation system e.g. hill, river valley, or Terai system. A general description of the systems under study is given in Table 3.1, and their locations are shown in the following figure:

Table. 3.1: Description of Farmer Managed Irrigation Systems Selected for Resource Mobilization Study[7]

	Name of the system	District	Source of Water	Command Area (Ha)
	Hill Irrigation Systems			
1	Raj Kulo	Palpa	Kurung Khola	48
2	Thulo Kulo	Palpa	Barangdi Khola	40
3	Tallo Kulo	Palpa	Barangdi Khola	46
4	Upallo Kulo	Gulmi	Hungdi Khola	40
5	Sota Kulo	Gulmi	Hungdi Khola	25
6	Satrasaya Phant	Tanahu	Aandhi Khola	40
7	Baraha Kulo	Tanahu	Aandhi Khola	15
8	Sange Patiyani	Tanahu	Sange River	208
9	Phalebas	Parbat	Khalte and Lamahaya River	134
	River Valley Systems			
1	Charhajar	Tanahu	Sange Khola	200
2	Bhanu Baraha	Tanahu	Chudi Khola	120
3	Charsaya Phant	Tanahu	Chudi Khola	50
4	Badkapath	Dang	Rapti River	800
5	Rani Kulo	Pyuthan	Dharmabati	75
6	Gorkhe Kulo	Pyuthan	Dharmabati	180
7	Kwadi Kulo	Pyuthan	Dharmabati	55
	Terai Systems			
1	Chhattis Mauja	Rupandehi	Tinau River	3500
2	Pithuwa	Chitwan	Kayer Khola	900
3	Lothar	Chitwan	Rapti River	800
4	Rani , Jamara and Kulariya	Kailali	Karnali	15000
5	Karjahi	Dang	Katuwa Khola	745
6	Tedi-Gurgi	Kailali	Kateni	4500

Source:

3.2 Organizational Basis for Resource Mobilization

No single factor or element brings water users together in an irrigation organization. Different systems have different elements that stand out in this aspect. Water right issues, resource mobilization, water distribution, a sense of belonging to the community, preservation of an individual's water right are different unifying factors. However, it is not necessary to have all these features for an irrigation organization to function. In the following section, two major factors affecting resource mobilization in FMISs are described.

7 Sources: Information is collected from Prachanda Pradhan 1989. Patterns of Irrigation Organizations in Nepal. Colombo: IIMI, Prachanda Pradhan, Khadga Giri and D.Tewari. 1987. " Resource Mobilization and Organization Support in Irrigation System Management: Experiences from Kulariya, Jamara and Rani Kulos of Kailali District in Irrigation Management in Nepal: Research Papers from National Seminar. Colombo: IIMI and Rita Hilton. 1990. Cost Recovery and Resource Mobilization in Irrigation Systems in Nepal: A case study of Karjahi Irrigation System. Maxwell School of Citizenship and Public Affairs. Syracuse: Syracuse University.

Water as community property: an organizing force to mobilize resources for O&M

The dynamics of the functioning of FMISs can be better understood from the perspective of common property resource management. Valuing water, as "Community Property" can become the organizing and unifying force for farmers in a given system. The effectiveness of an irrigator's organization can be placed on a continuum ranging from anarchic to well organized depending on the collective interest in irrigation water. Non-compliance with rules for water acquisition, allocation and distribution, and resource mobilization results in "anarchic" application of irrigation water, where individual interest prevails over collective interest. In an well-organized system, irrigation-related tasks are performed collectively by the beneficiaries, or all individuals carry out group-agreements.

Anarchy in an irrigation system results when group norms and values are not observed. Water is then considered as a resource to be extracted for individual benefit on the basis of "might is right". In an anarchic situation, water allocation, acquisition, distribution and conflict resolution depend on individuals resolving problems with other individuals. Generally, the more powerful and influential individuals are able to extract a larger share than others.

In an well-organized system, the acquisition of irrigation water and its application for agriculture use are based on community decisions. Committee members are elected or selected to manage the system on behalf of the community and are accountable to it.

Water acquisition is usually a collective effort, i.e. the community pools its resources either in the form of cash or kind or labor to do this. The allocation principle is also decided collectively by the irrigator community. The distribution of water according to the criteria prescribed by the irrigator community is an effort to distribute the community resource for individual use. Limits are placed on the extent to which individuals are allowed to use these resources.

If one violates the norms of allocation or distribution by "stealing" water or depriving others of the share of water assigned to them by the community, he is subject to punishment. A penalty is imposed depending on the gravity of the offense and according to the norms and values of the system. The irrigator community determines the terms of the penalty. This is intended to prevent an individual from extracting more resources than allocated by the community.

Within FMIS collective decision-making, transparency and accountability are institutionalized. The executive committees of the FMISs are usually accountable to the general assembly of the irrigators association.

The Pithuwa Irrigation system, which was constructed in 1972, illustrates the transition from anarchic to organized irrigators for water management. This system was constructed and operated by the government for some time. Management by the agency resulted in disregard for other farmers' equitable water share, and water stealing became a common feature. In an effort to receive water more equitably and reliably, the farmers of branch 14 decided to "communize water" at their outlet. They determined conditions for water allocation and distribution and penalties for misuse. This concept led to a change in the management system whereby individuals were required to conform to the values and norms stipulated by the group. The effort to communize the water resources in the Pithuwa system according to the community decision helped the formation of an irrigation organization to direct water acquisition, allocation, distribution and conflict resolution. In Pithuwa, the irrigation organization is currently operating at system and branch levels. This example demonstrates the importance of the perception and values of the beneficiaries regarding water as a community resource requiring collective management. The general assembly of the WUA played an important role in institutionalizing the transparency and accountability in the system.

According to East Rapti Project, the WUA of Pithuwa system played an active role in internal resource mobilization, contributing NRs. 3.6 million as its share for system rehabilitation, rehabilitation design and supervision of construction during rehabilitation. (Personal communication

with Mr. Purushottam Kumar Shahi, Project Manager, East Rapti Project during authors' visit to Pithuwa system in January 1998).

Mobilization of workforce for O&M

Labor contribution is the main resource for operation and maintenance of the system. The major task of all irrigation organizations is the mobilization of labor for operation and maintenance .. In some systems, such as Chhattis Mauja of Butwal, Rani, Jamara and Kulariya Irrigation systems of Kailali District and Karjahi Irrigation System of Dang District, the need to mobilize a large number of labor is the major concern of farmer organizations . Comparatively small systems in the hills of Nepal are also organized for t labor mobilization. Good examples are, Raj Kulo of Argeli, Thulo and Tallo Kulo of Chherlung of Palpa district.

In order to make water available to 3,500 ha within Chhattis Mauja irrigation system, large-scale labor mobilization from within the system is necessary. An elaborate mechanism has been developed so that about 60,000 labor-days (in 1983-84) can be mobilized for desilting the main canal and repairing the intake and diversion weir in the Tinau River. The organization has strict rules to ensure that those who come to work really work. The organization has maintained discipline to work on its own and mobilize required resources internally. The number of laborers for main canal maintenance is determined by the water rights of an outlet group.

The organization has different ways of mobilizing labor . The main canal cleaning is the responsibility of the main committee. It designates the number of laborers to be mobilized from each village based on the amount of land irrigated in each village . The number of laborers required depends on the task, emergency repair needing twice the work force as regular repair. . It is reported that 31,500 labor days and cash of NRs. 114,600 were mobilized in the 1995/96 agricultural season in Nepal At the current wage rate of NRs. 60/ per day, the labor input is valued at e NRs. 1,890,000. The total contribution amounts to NRs 2,004,600 or or NRs. 573/hectare for O&M in Chhattis Mauja. This amount covers only the cost of main canal repair and maintenance . The cost of O&M of Mauja (village) level is not included (Field Survey, IIMI-Nepal, 1998).

Some Hill irrigation Systems constructed on fragile terrain have mobilized more of their resources to keep the system operational during the rice season. Raj Kulo of Argeli, Tallo Kulo and Thulo Kulo of Chherlung are examples of such systems, where the unifying force is the need to mobilize resources at short notice.

Prior to 1987, Kulariya, Jamara, and Rani Kulos of Kailali each had their own irrigators' organization, which functioned independently of each other. The general assembly, which is called *Desawar*, is the decision-making body for labor mobilization. On 18 February 1987, a joint committee of the three irrigation systems was formed for the purpose of obtaining external support for the O&M of irrigated lands in the command area.

In 1987, the Ministry of Agriculture provided a cash grant of approximately NRs. 70,000 (USD 3,076) and a bulldozer to help with the repair and maintenance of these systems. This was only a one-time assistance from the government. However, water users of all three canals worked together to divert water from the Karnali. This is a regular activity undertaken each year before paddy season. According to the records, the Kulariya Kulo was responsible for providing 963 labourers, Rani Kulo 353 and Jamara Kulo 740 laborers, i.e. a total of 2,056 persons l, for each day of work. Table 3.2 gives the actual details of the labor-days contributed in the main canal diversion work. It shows that, on average, 2,124 persons worked each day. Over a period of time, the irrigation committee received gabion wires and assistance from the government for strengthening weak sections of the channel. This helped to reduce the required number of laborer to some extent, yet the mechanism for labor mobilization and other resources for O&M remained the same (Personal Communication with Mr. Lal Prasad Chaudhary, Secretary of the Joint Committee of Irrigation Systems, 1996).

Table 3.2: Details of Labor Days Utilized in Main Canal Diversion Work

Day	Number of days	Canal Subsystem	Number of persons per day			Person days	
			Working	Supporting	Total	Working	Total
6-14	8	Rani Kulo	357	163	520		
		Jamara Kulo	449	220	669		
		Kulariya Kulo	632	270	902		
		Sub total	1438	635	2091	11,504	16,728
13-24	11	Rani Kulo	667	121	788		
		Jamara Kulo	648	154	802		
		Kulariya Kulo	519	152	671		
		Sub total	1834	427	2261	20,174	24,871
24-26	3	Rani Kulo	347	170	517		
		Jamara Kulo	448	204	652		
		Kulariya Kulo	329	214	543		
		Sub total	1124	588	1712	3,372	5,136
		Total	4396	1650	1650	35,050	46,735

Source: Khadga Giri's field observation record, February 1987.

Desawar in action in Rani, Jamara and Kulariya systems

In local parlance , mobilization of labor of all beneficiaries is called *"Desawar"*. The term *Desawar* represents an elaborate process to mobilize labor. About 1,500-2,000 persons are mobilized daily for the desilting of the main canal in these systems. This is an important feature of the organization, which has direct relevance to large-scale workforce mobilization. The general assembly of the system organization supervises only the work relating to main canal desilting.. The *Pan Chirage* (messenger of the central committee) announces the date for mobilization for canal repair at the location Chisapani, as decided by the D*esawar* (General Assembly). The irrigators are expected to be present at the work site and work for a period of five days.

At Chisapani, the farmers construct temporary sheds and a common kitchen for each village. Each village is expected to bring the following items to the work site: 1) 5 kg of rice; 2) cooking oil, salt, red pepper; 3) plates and drinking glasses; 4) quilts or blankets; 5) picks (*Pharwas*), axes, and sickles; 6) round umbrellas of bamboo (local); 7) *Bankas* (a kind of grass to make rope) or net weaving thread; and 8) cooking pots and water cans. The cooking pots are community property, used only for *Desawar*.

The *Nandarwa* (measurer) carries a 10-feet long pole and the workers follow him. The name of the village and amount of the work to be done is called out by the *Lekhandaran* (Secretary of the system) from the record book, and the work to be done is assigned and measured out. . As soon as the work is assigned, the people start work on the canal. The work should be completed within a fixed time period . The *Nandarwa* assigns the width and depth of the excavation to be done. When the work assignments are being made another person walks ahead of the *Nandarwa* carrying the 10-feet pole with a white cloth hanging from the top. This man's job is to show the target location to the *Nandarwa,* above the press of the crowd of workers in order to be able to lay out the canal in a straight line.

If the assigned number of people from the village do not show up, the work is not completed. The *Chaudhary* of the system summons the *Badghar* or Assistant *Chaudhary* of that village. If the people

from that village do not appear for work, the whole village is fined. The fine is usually collected in cash. If the village is reluctant to pay the fine, the *Desawar* visits the village and has authority to collect the fine by any means.

Labor Mobilization for O&M in Pithuwa Irrigation System

The labor mobilization for O&M in Pithuwa system is also extensive . The labor mobilized in 1993 is given in Table 3.3.

Table. 3.3: Amount of Resources Spent in Pithuwa Main and Branch Maintenance in 1993

Canal	Labor/man days	Cash in NRs.	Grain in Pathi[a]	Remarks
Main Canal	2,000	8,000		Main Canal cleaning
1	50	0	-	Branch Canal cleaning
2[+]	1,482	6,800	800	"
2A	200	0	50	'
3	102	650	43	"
4	55	0	29	"
5	0	900	39	"
6	60	350	39	"
7	20	0	13	"
8	111	550	97	"
9	0	1,100	60	"
10	130	500	78	"
11	0	750	64	"
12	0	1,015	39	"
13	79	1,000	49	"
14	0	525	30	"
15	0	900	60	"
16	50	0	83	"
Total Quantity	4,339	23,040	1,603	
Total Value in NRs.[g]	402,442	23,040	19,663	

[a]. One pathi = 3.5 kilogram; [+] Includes the maintenance of Budi canal and [g] Value at market rate

Source: Naresh Pradhan. 1994. Technical Efficiency, Institutional Analysis and Transaction cost of Public Irrigation Systems under Farmer and Government Management in the Terai of Nepal (Unpublished Master Thesis), Manila: University of the Philippines, Los Banos.

3.3 Resource Mobilization and Management

Resource mobilization and management are the main tasks of irrigation organizations. Three types of resources are mobilized. First, labor contribution for repair and maintenance is the most common resource observed in all the systems. Cash contributions in lieu of labor are a second type. A third type of resource mobilization is material contribution such as bullock carts to transport boulders and forest products or construction materials such as gabion wire. These resources are mobilized from among the beneficiaries of the system, i.e. internal to the system. The other resource is from outside the system, or external resource mobilization. External resource mobilization includes contribution from the government or other agencies. This may include a monetary grant from Non-Governmental Organizations (NGOs) for a specific purpose, a regular government contribution for O&M, or a material contribution by the government supplying gabion wire or cement for strengthening the physical system.

Contributions from outside the system are also sought when the repair of the system is beyond the capacity of the beneficiaries. Most of the irrigation organizations have provision for resource mobilization to meet emergency situation. Hence, the basis of the resource mobilization differs from system to system. But resource mobilization is one of the most important tasks in all irrigation systems.

All the systems in the study have up-to-date records of the water share each member is entitled to, and records of contribution to be made by each member for the system maintenance and operation, along with annual income and expenditure of the system.

Prior to the desilting of the canal and repair of the intake, resource mobilization is always at the top of the agenda, at the farmers' meeting. A report on the resources that were mobilized and individuals who contributed to the effort during the past year is prepared by the secretary of the organization and is reviewed at the general assembly meeting each year. The farmers also discuss methods for the collection of dues from the beneficiaries.

3.4 Basis for Resource Mobilization

The resources that each beneficiary must contribute are usually related to the person's water allocation. The amount of cash or labor per unit of water is determined by the general assembly of the irrigators at their annual meeting. Once the contribution rate is agreed upon and approved, the committee enforces it strictly. Exemptions are seldom allowed. Collection of dues as part of resource mobilization is strictly implemented.

Contributions of labor by the farmer-members are the most common form of resource mobilization. However, the method by which the labor contribution requirement is calculated differs from system to system. It is usually calculated in terms of how much labor days a farmer (a household) must contribute for the entire period for either group maintenance or repair of channel structures.

(a) *Labor contribution in proportion to land holding within command area:* Labor contribution proportional to land holding within the command area seeks to achieve equity between big and small landholders. Those with big holdings are required to contribute a larger share to group work than small landholders.

A farmer with 20 mato muri (0.25 ha) in Raj Kulo of Argeli is required to contribute one labor unit per day until routine maintenance and repair are completed, irrespective of the number of days taken. A person holding 10 mato muri (0.12 ha) contributes one labor unit on alternate days. Twenty mato muri is the land holding unit used to calculate the labor contribution for irrigation maintenance. Every one using the irrigation facility must contribute labor without exemption . The ratio of 20 mato muri to one laborer per day is also followed

in Charsaya Kulo, whereas in Bhanu Baraha, beneficiaries must contribute one laborer per day for every five mato muri (0.6 ha) they irrigate.

In Rani Kulo, Gorkhe Kulo and Kwadi Kulo, the irrigators have fixed a landholding category relating to the labor contribution required: up to 16 mato muri (0.2), one labor unit ; from 16 to 32 mato muri (0.4-0.5 ha), three labor units . Here, the category is the basis, not a proportion as observed in Raj Kulo of Argeli.

In the Charhajar system, the main canal is divided into three sections, Barahabote, Agrakhe and Bahatar dam. Cleaning of the canal starts at the tail. All the beneficiaries start working from the tail , but the farmers having only five mato muri are required to clean the main canal only up to Barahbote or pay 75 paisa per mato muri. This section is only one-third the length of the main canal. Farmers having up to ten mato muri clean up to Agrakhe, and farmers having 15 mato muri must clean up to Bahatar dam. Farmers irrigating more than 15 mato muri must work from the tail up to the main intake. When it is time to construct the brush diversion dam, all the beneficiaries must provide additional contributions. Beneficiaries irrigating 5-10 mato muri must contribute 2 days of labor for repair of the diversion dam. Those with 10-15 mato muri contribute 2-4 days labor and those having 15-20 mato muri can contribute either labor or cash. However, farmers with over 30 mato muri must contribute labor.

(b) *Labor contribution in proportion to investment by farmers:* In the Thulo Kulo and Tallo Kulo of Chherlung, a farmer owning one water share must contribute one labor unit for system maintenance. An additional contribution is calculated in proportion to his water share and he must continue to provide this amount of labor for as long as the maintenance work lasts.

In Phalebas, anyone holding water share worth one rupee or more is required to contribute one laborer during maintenance and repair work. Recently, the farmers were allowed to make cash payments in proportion to crop yield in lieu of labor.

(c) *Labor contribution on the basis of outlet size.* Labor contributions based on the size of the outlet serving the command area is seen both in big and small systems. This is observed in big systems such as Badkapath or Pithuwa, where many laborers have to be mobilized for desilting the main canal and repairing the intake and diversion dam. schemes. In small systems such as Baraha Kulo of Yampa Phant, fewer laborers are available; therefore, the provision of labor contribution on the basis of outlet size is enforced, to ensure that sufficient labor is available to perform the repair work..

In Badkapath, a village with an outlet of one *lathi, farmers* must contribute 16 laborers for repair and maintenance of main canal. Within the village served by the particular outlet, labor mobilization is based on landholding size and it is designated as one laborer for every three hectares of land.

In the Pithuwa system, the central committee assigns the cleaning of certain sections of the main canal to specific branch committees whose members must then mobilize the farmers in their own branches. The central committee divides the main canal into 16 sections since there are 16 outlets, and assigns a section to each branch committee. The farmers can decide to desilt the main canal themselves or they can give a contract to a third party and pay the labor cost. At times, the central committee allocates certain amount of money to each branch committee to subsidize the cost of cleaning the canal. This money may not cover the full cost of the job, so the branch committee must make up any difference in the cost.

Where there is proportionally large requirement for labor, labor contributions may be assessed on the basis of the size of the outlet. This method assigns to the branch committee all responsibility for determining how much each individual must contribute.

(d) *Labor contribution according to the area cultivated in the village.* Chhattis Mauja is a large farmer managed irrigation system, which mobilizes thousands of man-days each year for maintenance of the main canal, intake and repair of the diversion dam. This system's command area includes 54 villages. Each village has its own outlet from the main canal. The amount of land irrigated by each outlet is used as the basis for calculating the labor contributions required in Chhattis Mauja. The term used for such mobilization is *maujane khetara.* One *maujane khetara* is equal to 20 laborers from one village. The number of *maujane khetara* varies in proportion to the irrigated land in the village. The *meth mukhtiar* (technical supervisor) of the central committee assigns the length of the main canal to be desilted by each village. The measurement unit is known as *Nath*, a stick seven and a half feet long. The length and specifications for desilting are assigned to the village by the *meth mukhtiar* who supervises the work. The villagers have to work until he is satisfied with their performance. The *meth mukhtiar* can impose punishment on a village for poor work performance. Within the village, labor mobilization is based on the size of the land holding, calculated according to one person per 1.25 ha.

(e) *Labor contribution on the basis of households in the command area.* In some systems, the labor requirement for canal maintenance and intake and diversion repair is very high. All households cultivating land in the command area have to contribute labor. The Lothar Irrigation System in Chitwan district is an example where labor mobilization is based on the number of households in the command area, and not on the basis of the land holding. This system has 300 landholders but sometimes they have to mobilize more than 300 people in a day. In the early rice season, because of water shortage, the irrigation organization allows the cultivation of rice on only 25 percent of land. Therefore, persons with large landholding lease out fallow land to land-less people on a sharecropping basis. The sharecroppers often manage to get water to the leased land and to cultivate rice. Once they have used irrigation water for agriculture, they are obliged to contribute labor to the system whether they own land or not. Leasing of land to landless people in order to mobilize additional labor is an unusual system in Nepal. This type of labor mobilization contributes only a small proportion to the number of laborers the system requires.

Example of Labor Mobilization from Tedi Gurgi Irrigation System of Kailali

Elaborate rules and regulations have been formulated to mobilize internal resources for maintaining the system. Since regular maintenance is crucial for operation of the system the organization has given priority to mobilizing resources to carry out regular maintenance. The labor mobilized is not based on the size of the landholding but on the available manpower in the household. When the system was constructed 53 years ago land was abundant but labor was in short supply. This led to the acceptance of basing labor mobilization on the number of able-bodied males in a household.

Two categories and two levels of labor mobilization have been developed. If a household has four or more able men, that household is required to supply one person-day of maintenance work for the entire duration of the work. This category is called D*hariya.* If the household has two or three able men they must contribute four continuous person-days out of every eight days of maintenance work. This category is called *Palaha.* The *Bhalmansa* of each village arranges the rotation among the *Palaha.* However, when there is an emergency, they double the labor requirements of the routine level in what they call *"Jharali Kulo"*. Women are not usually allowed to work in the irrigation maintenance.

The Bhalmansa prepares a list of workers from each household each year for presentation at the irrigation meeting in April. After this list is approved it becomes the basis for assigning work to each village. By assigning work on a piece basis to a village, the organization avoids the need to keep attendance records of the total organization level. Monitoring attendance from each village is the responsibility of the B*halmansa*. Social pressure from village members encourages attendance.

Each laborer is required to bring his own tools, which must consist of at least an axe, a sickle, and a hoe (*Phaduwa*). Because of the long distance between the intake and last villages in the system, maintenance crews are required to stay overnight at the site of the maintenance work. Each person is required to bring a specified amount of food. For example, a person staying for eight days is required to bring 20 kg of rice, and enough vegetables, pulses, salt, oil, and curry ingredients to eat with it and contribute it to the village's common kitchen at the site. Each village has a set of cooking vessels and utensils that are kept for this occasion.

Examples of Labor Mobilization in Karjahi Irrigation System in Dang

System level: When work is to be done on the main system, the head *Mahato* calls *Jharali*. This means that all *mauja* in the system must contribute their full labor obligation. All seven *Mauja* of Karjahi irrigation system are responsible for supplying a certain number of labor each day when *Jharali* is called. This implies that all farmers must contribute their full labor obligations. A *Mauja's* contribution is the sum of individual constituent farmers' contribution. Therefore, if a given farmer fails to make his obligatory contribution, the *Mauja* necessarily falls short of its commitment.

Mauja level: Within each *M*auja of Karjahi, labor obligations are determined in units of *Kalami.* The *Kalami* liability of a given household is based upon the land area farmed by that household. The base unit of calculation varies from *Mauja* to *Mauja*, but roughly, three *Bigha* is equal to one *Kalami.* One *Kalami* translates into one laborer owed each day that work is called. Thus, if a farmer owes one *Kalami*, he must supply one laborer.

In some *Mauja* there are provisions for those farming less than a full unit-- i.e. a farmer with one hectare would need to contribute a laborer for only one-half day each time *Jharali* is called. In other *Mauja*, no such relief is allowed. In this case , farmers must contribute a laborer for the full day, regardless of how little land is farmed. Whatever the basis for calculating *Kalami*, farmers are required to supply their full quota of laborers each day that their respective *Mauja Mahato* dictates (Hilton 1990).

3.5 Cash Contributions from Beneficiaries

(a) *Land holding as the basis for fixing the rate of contribution*: There are systems where the maintenance responsibility is contracted out to a third party. These systems need cash to pay to the contractors. In the Upallo Kulo of Damka, NRs. 160 is collected in cash for maintenance of the system. In Satrasaya Phant, farmers pay NRs. 100/ha. Many young people moved out of Satrasaya Phant after the opening of the Prithivi highway to Pokhara, Kathmandu and Narayanghat and found employment in the service sector. It created a void in the process of labor mobilization on a daily basis as used to be in the old days. Hence, the irrigation committee formed by the general assembly decided to contract out the O&M responsibility. The general rules of O&M are spelt outt by the committee, which also supervises O&M work and pays the contractor. In this process, the irrigators are required to pay for O&M to the committee on the basis of area.

In the Sota Kulo of Damka of Gulmi, the residences of the farmers are far away from the command area. It becomes difficult to mobilize the farmers regularly for O&M so the contract system for O&M was introduced. The landowners pay cash for the contract work. In both systems, in case of extensive damages, the farmers also contribute labor for maintenance.

(b) *Yield as the basis for fixing the rate of contribution:* In Sota Kulo of Damka, the contribution for maintenance is raised on the basis of the yield of the land. NRs. 4.50 is fixed for one *Muri* (60 kg.) of rice yield. Previously, the farmers maintained the system by themselves. One person per household irrespective of the size of the holding was required to contribute labor but this method did not work well because most of the Sato *Kulo* farmers do not live within the command area. They also wanted a more equitable method for mobilization of labor. As an alternative, farmers introduced the system of giving a contract for regular maintenance work. In order to raise money, they decided to collect resources on the basis of yield. According to the farmer leaders of the system, collection of the resources on the basis of the yield protects the small and poor farmers. This also incorporates many other considerations such as quality of soil, availability of water and locality (i.e. whether the land is located at the head or the tail of the system).

In some systems where cash is collected in lieu of labor contributions, as in Phalebas, the irrigation committee has worked out ranges for production. A farmer with 1-10 *Muri* rice production has to pay NRs. 80; 10-20 *Muri* of rice is assessed NRs. 120; 20 and above NRs. 190.

Cash collection process: It is the general assembly of the irrigators, which decides the amount of cash to be collected. It also decides the basis of cash collection. The basis of cash collection shall be either land unit or the amount of money required for completion of a given piece of work. In the irrigation systems, the Secretary (also called *Bahidar or Sachib*) shall collect the cash from the beneficiaries and keep account of that collection. In some systems, he will keep the money, and provide for expenses of the system from the collection. . In other systems, money is kept in the bank on the joint account of the chairman and secretary. In the annual general assembly meeting, statement of the income and expenditures will be presented at the meeting for approval. In some systems like Chhattis Mauja, there is provision of auditing. In some systems, cash is reserved for future use whereas in other systems, the total amount collected in the year will be spent on a feast or distributed among the active members who have contributed extra labor days for the maintenance of the system. This situation occurs where the majority of the cultivators are sharecroppers.

Collection of cash from penalties: In systems where labor contributions are required, strict rules are enforced. Except for the possible exemption of irrigation committee members, any persons who fail to provide the required labor contribution are fined. In some systems, the absentee is fined the equivalent of a day's wage. In systems where there is a shortage of labor or where alternative employment outside the system is easily available, the penalty for absence is set at double the wage rate of the area. These penalties are imposed to discourage people from being absent and to make maintenance a community effort.

Should the call for emergency maintenance be ignored, the penalty may be increased to two to four times the daily wage rate of the area. These penalties are enforced vigorously. Non-compliance can lead to collection of the fine by use of force, or depriving the violator of irrigation water, or to ostracism.

In Tedi Gurgi system of Kailali, only the households with no able males are exempted from contributing labor and must instead pay cash on the basis of their landholding which is called *Paanikar*_(water tax). In 1986 the tax rate was NRs. 40/ Bigha. The *Batiyas* and *Adiyas* (sharecroppers) are not required to contribute labor. They pay half of the water tax and the landlord pays the other half.

In addition to the water tax, those who do not contribute labor must also pay a bullock cart tax. In 1986, The tax rate for bullock carts was NRs. 35 in 1986 while in 1985 the rate was NRs. 30. In 1986, a total of 468 households paid the total tax and the amount collected was NRs. 30,010. Money is also collected from anyone pumping water form the canal who is not already contributing labor or cash for the maintenance of the system. The rate in 1986 was NRs. 300/pump.

Most of the cash is spent for a feast at the end of the season. This is called the *Paanikar* feast and only persons who have actually worked on the maintenance attend. A similar example is also found in Karjahi irrigation system.

3.6 Resource Mobilization During Emergency Situations

All systems have mechanisms for emergency management. . Emergency activity can be grouped as follows as

1) ordinary repair which needs immediate attention requiring perhaps 10-15 people;
2) large damage which requires the mobilization of all members, but the system itself is not in grave danger; and
3) endangering damage which requires mobilization of all residents of the villages within the command area. If the necessary steps are not taken immediately, the whole crop might be lost or the physical system might sustain major damage.

The intensity of the emergency situation differs with the type of irrigation system. Hill irrigation systems and Terai systems with intakes from big rivers usually have detailed procedures for emergency operations.

In Raj Kulo of Argeli, and Thulo Kulo and Tallo Kulo of Chherlung, different names are given for different types of labor mobilization. Ordinary mobilization is called ***Mamulate***; the large mobilization which needs immediate attention but is not so serious is called ***Jhara***; and emergency efforts which require not only the work of all members of the system but of the whole village is known as ***Mahajhara.***

Different terms are used for the mobilization of labor in Chhattis Mauja. These are:

1) ***Double (Dobbar)***: When something happens and normal mobilization alone cannot cope with this situation, double the work force is mobilized.

2) ***Jharulra:*** This is a kind of emergency call; four times the usual work force is mobilized. This type of call is made when the diversion dam is washed away or breached by floods during the cultivation of rice.

3) ***Site Jhara***: When some big crisis occurs in the irrigation system, people are mobilized by the sound of a whistle. All men above 14 years of age (those wearing a cap) within the irrigation command area must respond to the call. People using water for utensil cleaning or for animals are also required to contribute labor during this type of mobilization.

In the Badkapath system, if the farmers of the systems alone cannot handle the emergency situation, the ***Paani Pradhan*** asks the ***Paani Pradhans*** of other systems within the Deukhuri valley for help. The farmers of other systems cooperate to fix the systems, knowing that they may have to request for similar help at some time in the future. The systems in the Deukhuri valley all have intakes off the large, strong Rapti river, and emergency situations often arise requiring this type of inter-system cooperation.

Even in systems where maintenance is undertaken through contract, there are provisions for mobilization of farmers in case an emergency occurs in the system. In Satrasaya Phant, Upallo Kulo, and Sota Kulo of Damka, a provision is included in the contract that if a needed repair in the system cannot be completed by the contractors in three days' time, all the farmers of the system shall be mobilized to complete the job. In all systems, the provision for meeting emergency situations is spelled out by the irrigation organization.

3.7 External Resource Mobilization

Resource mobilization from outside the system includes resources of cash and kind mobilized from the central or local government, or through labor contributions from other systems in emergencies. Farmer-managed systems look for outside resources, firstly, for augmenting, assuring, and minimizing the labor requirements for maintenance, and secondly, for increasing the volume of water flow in the system.

Raj Kulo of Argeli received help from the government to rehabilitate a large section of the main canal along the hill. This has helped them reduce their annual maintenance task and made the flow of water more reliable.

Thulo Kulo of Chherlung has been mobilizing resources from the Village *Panchayat* for canal improvement over the last several years. Weak points in the canal have been rebuilt with these external resources. Recently, they borrowed NRs. 83,000 from the ADB/Nepal to install a water turbine in the canal to mill grain. The money earned from milling will be the property of the Thulo Kulo irrigation organization and used for maintenance and repair of the system. Under Irrigation Line of Credit (ILC) program, the Thulo Kulo of Chherlung received assistance from the government for rehabilitation of the system. Major rehabilitation took place. This helped reduce the annual labor requirement according to the Secretary of the Thulo Kulo Irrigation committee (Personal Communication with the Secretary of Thulo Kulo, Chherlung, 1995).

The Pithuwa irrigation system receives about NRs. 40,000 a year from the Department of Irrigation for O&M and a bulldozer for three months to clear the sand and boulders from the intake. Besides the government grant, the farmers mobilize labor and their own cash for maintenance and repair of the system.

There are instances when resources from outside the system are mobilized by selling water. Thulo Kulo of Chherlung expanded its command area by selling water for a new area, and the money thus collected was used for improving the system so that more water became available. This also added new members to the system.

In Raj Kulo of Argeli, after the rehabilitation of the main canal, maintenance was reduced and water delivery became more reliable. The irrigation committee decided to sell extra water to a new area and contribute the money thus raised to local school improvement. However, the objective of this scheme has not been realized yet.

3.8 Use of Cash Income

Cash income acquired by the organizations is used for many purposes.

Developing Physical Infrastructure by Strengthening Weak Points of the System

Many irrigation systems have made innovations and improvements over a period of time using the money raised either from within or from outside the system. When many irrigators were tenant farmers in Raj Kulo, they were not interested in improving the system, and the money collected from fines was spent on feasts at the end of the irrigation season. When the land reform program was introduced, absentee landlords were forced to sell their land to small farmers. When many of the tenants became landowners, a feeling of ownership over the irrigation system developed among these farmers and efforts were made to invest money in physical improvements. This led to more investment in the system as farmers saw improved irrigation facilities as being closely linked to agricultural productivity.

In Thulo Kulo and Tallo Kulo, after the initial investment for system construction was made, the farmers continued to strive to improve the system. As a result they have been able to bring more water into the command area. Again, a feeling of ownership of the system encouraged farmers to continue to invest in the improvement of the system.

In Upallo Kulo and Sota Kulo of Damka, the irrigators have invested money for tunnel improvement and canal widening on several occasions. This helped bring more water into the command area so that less emergency maintenance was required.

Investment of Money for Interest Earning

Rani Kulo and Bhanu Baraha Kulo have both used the cash collection from fees as capital for providing loans on interest. The interest earned from the loans is eventually used for the improvement of physical infrastructure. During the time of this study, Rani Kulo had NRs. 15,000 in savings and Bhanu Baraha Kulo had NRs. 800.

Payment for Services Rendered to the System

Salaries of employees of the system are paid from the cash collected. The salaries of messengers, honorarium for the committee chairman at Chhattis Mauja, and honoraria for the *Chaukidars* of Tallo Kulo, Thulo Kulo, Phalebas, and the *Jimmuwal* of Charhajar Kulo are paid from cash incomes collected from these systems.

Contributions to the Local School

The Lothar irrigation system had savings of NRs. 15,000 which was deposited in the local bank. The community allocated some funds from these savings for the operation of the local school.

Expenses in Buying Equipment and Materials

Some systems such as Chhattis Mauja use cash income to buy equipment required for maintenance. Other systems have purchased bicycles for the organization's messengers.

Some systems do not want to maintain a cash balance. Rani Kulo, Charsaya Kulo, Badkapath, and Charhajar spend any remaining money at the end of the irrigation season or for paying their irrigation officials and at the end of the year on feasting

3.9 Landholding Record and Account Maintenance

All irrigation systems maintain records of the landholding of the members of the irrigation organization, and the records are updated each year. Landholding records are important for mobilization of the labor required for maintenance. Since the irrigation facility is available only for a certain defined command area, records are important in determining who is entitled to get a share of the irrigation water.

Another important reason for maintaining up-to-date records is to facilitate allocation of the share of water among different outlets according to the entitlements.

Records of attendance at maintenance and repair work are also kept. On the basis of these records, defaulters are required to pay fines for failing to contribute labor.

3.10 Methods for Collection of Fines

Collection of fines: Fines are imposed for failure to do maintenance work, for stealing water, for breaking the canal, and for other violations of the irrigation organization's regulations. Fines are collected from individuals or villagers as a unit, if an outlet is tampered with and/ water is stolen by an individual or by villagers at theses outlets. If the villagers involved are fined and do not pay the fines, the whole area served by the violators' outlet is closed.

The irrigation organization takes responsibility for collecting the fines. If some member does not pay the fine , other members of the organization can go to his house, confiscate utensils, and mortgage them in one of the village shops, to realize the amount of the fine. If the defaulter wishes to recover his utensils, he must pay the amount of the fine to the shopkeeper.

In some systems, the irrigators go to the defaulter's field and harvest rice equivalent to the amount of the fine. Before taking such action, the matter is discussed at a general meeting and the general body determines such a course of action. Record keeping for resource mobilization and strict collection of dues are two features which make farmer-managed irrigation systems function even under adverse physical condition or weak structures.

Type and level of fines: At the system level, the penalty for failing to contribute required labor is NRs 45 per *Kalami* per day. *Khara* is levied on individual defaulters or entire *Mauja* if they fail to show up for *Jhara* when called. If individual farmers owe *Khara,* then proceeds from the penalty go to his *Mauja.* If, however, the entire *Mauja* fails to contribute the required labor, then proceeds accrue at the system level.

At the *Mauja* level in Karjahi, the rate of *Khara* for failing to contribute labor is NRs. 30 per *Kalami* per day. This applies on days when work is performed on branch and tertiary structures. *Khara* is applied basically at the discretion of the *Mauja.* If a farmer has a good excuse (i.e. death in the family), then an exemption will usually be granted. If, however, someone fails to contribute labor so he can work in his field (or because he's just lazy) fines are imposed. Proceeds of *Mauja*-level *Khara* are retained by the *Mauja.* They are typically used to purchase *Khasi* for communal celebration.

Khara is both imposed and enforced in Karjahi. Fines are typically assessed against household at the time of default on *Kalami,* but collection may be delayed until the annual meeting in Magh (December-January). Regardless of the time at which fines are levied, there is no difficulty of delinquent payment. If a farmer fails to pay the assessed *Khara,* other farmers in the *Mauja* may visit his household as a group and confiscate whatever property they choose. Examples of items that might be seized are livestock, harvested grain, or pots. Since the value of any one of these items exceeds the likely value of any *Khara* that would be imposed, farmers have a strong incentive to pay what they owe.

Sanctions for not contributing to the System in Tedi-Gurgi system: If individuals do not show up or contribute their share to the maintenance and operation of the system it is of no consequence to the irrigation organization. Such problems must be solved by the village, since it is the village that is expected to discipline or control the slack of any of its members.

If a village fails to contribute its share to resource mobilization, its access to an outlet can be cancelled.

A new village can make applications for new outlets by paying NRs. 1,001 and agreeing to the rules of resource mobilization. However, the committee has been reluctant to accept new outlets from the main canals since it disrupts water allocation. Instead they have been allowing new villages to join with villages having existing outlets.

3.11 Operation and Maintenance Cost of the System

The O&M cost per hectare in hill, river valley, and Terai systems vary. . O&M cost in Hill systems ranges between NRs. 400-NRs. 535/ha, compared to NRs. 100/ha in river valley systems and NRs 270-572/ha in Terai systems. (See Table 3.4).

In hill irrigation systems, conveying the water from the source to the command area requires the greatest effort of the users. The canals from the intake to the command area are usually long and pass through steep, rocky terrain prone to frequent landslides, thus requiring frequent repair. This component is costly and requires large amounts of labor each season.

Terai irrigation systems usually have large command areas and use large rivers as their source of irrigation water. Floods in these big rivers wash away the intakes and require frequent repair to sustain a supply of irrigation water. Hence, in the Terai, maintenance of the intake is the largest component of cost.

River valley systems have lower O&M costs because their command areas are close to the water source and no long conveyance structures are required. The terrain is not difficult and fewer repairs are necessary.

Estimates of O&M costs have been made in the Tedi-Gurgi irrigation system, on the basis of the irrigation committee records. . There were 45 days of maintenance work in 1986 with a total of 294 man-days contributed per working day. Exemptions were not deducted in the analysis since some other service is provided to earn the exemption. A total of 13,230 man-days were required for maintaining the system. The average wage rate was estimated at NRs. 15/day. The total value of labor for O&M was NRs. 198,500 . In addition, water tax amounting to NRs. 31,255 was collected. It was also estimated that 300 bullock carts were employed for collecting materials from the forest. At a rate of e NRs. 35/bullock-cart set for those not providing a cart, the value of the bullock cart contribution was estimated at NRs. 10,500. . The total contribution was about NRs. 212,000. With an irrigated area of nearly 4,500 ha the cost of maintenance was only about NRs. 47 per hectare. The cost of operation and maintenance is very low when compared to most farmer-managed and government systems. The only major difficulty that they face is the shortage of forest products. Table 3.4 provides details of the contributions required for operation and maintenance per hectare according to type of irrigation system.

Table 3.4: Operation and Maintenance Cost per Hectare at 1996/97 Prices[8]

	Name of the system	O&M cost (NRs/ha)[9]	O&M cost at 1996/97[10] prices (NRs/ha)	O&M cost in US Dollars [11] (US$/ha)
		Terai Systems		
1	Chhattis Mauja	572 (97/98)	572	10
2	Pithuwa	741(94/95)	859	15
3	Lothar	430-680 (86/87)	1143-1808	20-32
4	Rani, Jamara, Kulariya	200 (88/89)	426	7.50
5	Karjahi	325 (89/90)	627	11
6	Tedi-Gurgi	47 (88/89)	100	2
	Average	385-427		
		Hill Systems		
7	Raj Kulo	300-400 (86/87)	798-1064	14-19
8	Thulo Kulo	500-700 (86/87)	1300-1862	23-33
9	Tallo Kulo	500-700 (86/87)	1300-1862	23-33
10	Upallo Kulo	160 (86/87)	425	7.46
11	Sota Kulo	80 (86/87)	212	4
12	Satrasaya phant	80 (86/87)	212	4
13	Baraha Kulo	100 (86/87)	266	5
14	Sange patiyari	600 (86/87)	1596	24
15	Phalebas	860 (86/87)	2287	40
	Average	482-535		
		River Valley systems		
16	Charhajar	37 (86/87)	98	1.50
17	Bhanu Baraha	40 (86/87)	106	2
18	Charsaya phant	35 (86/87)	93	2
19	Badkapath	50 (86/87)	133	2.33
20	Rani Kulo	180 (86/87)	478	8.40
21	Gorkhe Kulo	180 (86/87)	478	8.40
22	Kwadi Kulo	180 (86/87)	478	8.40
	Average	100		

[8] Figures are computed on the basis of information given by the farmers plus the records maintained in their record books. In Rani, Kulariya and Jamara systems, the O&M figures are only for intake and main canal maintenance (Martin, Ed., 1986). Each system after main canal is to be operated and maintained by the committee of each system. The cost is not included here. The O&M cost of Chhattis Mauja is computed on the basis of information collected by IIMI-Nepal Team, 1998. O&M figure for Pithuwa Irrigation system is adopted from Shukla and Sharma, p. 77 and figures from Naresh Pradhan's thesis.

[9] Figures in parenthesis are fiscal years.

[10] Conversion factor is derived from the national account figure from Department of Statistics 1998. Statistical Pocket Book of Nepal, Kathmandu: HMG, National Planning Commission Secretariat.

[11] Converted at US$ 1 = NRs 56.98 rate prevailing in 1996/97

Table 3.5 gives the picture of O&M share in cost of production and O&M share in net income; the share differs by the type of irrigation systems.

Table 3.5: Operation and Maintenance Share in Cost of Production and in Net Income

.	Name of the System (1)	District (2)	Cost of Production (NRs/ha) [12]		Total cost of Production/ (NRs/ha) (1995/96 prices) (5)	Total cost of production [13] At 1996/97 prices (NRs/ha) (6)	% of O&M share of cost of production at 1996/97 prices (7)	Net income at 1996/97 prices Rs/ha (8)	% of O&M cost of net income/ ha (9)
			Paddy (3)	Wheat (4)	(3) + (4)				
1	Raj Kulo	Palpa	16617	12354	28971	31289	3-4	13395	6-8
2	Thulo Kulo	Palpa	16617	12354	28971	31289	4-6	13395	9-13
3	Tallo Kulo	Palpa	16617	12354	28971	31289	4-6	13395	9-13
4 .	Upallo Kulo	Gulmi	16617	12354	28971	31289	1	13395	3
5	Sota Kulo	Gulmi	16617	12354	28971	31289	0.67	13395	2
6	Satrasaya phant	Tanahu	16188	12354	28542	30825	0.67	11270	2
7	Baraha Kulo	Tanahu	16188	12354	28542	30825	0.86	11270	2
8	Sange patiyani	Tanahu	16188	12354	28542	30825	5.00	11270	14
9	Phalebas	Parbat	16188	12354	28542	30825	7.50	11270	20
10	Char bajar	Tanahu	16188	12354	28542	30825	0.31	11270	0.86
11	Bhanu Baraha	Tanahu	16188	12354	28542	30825	0.34	11270	0.94
12	Charsaya phant	Tanahu	16188	12354	28542	30825	0.30	11270	0.82
13	Badkapath	Dang	12260	11120	23380	30825	0.43	7280	2
14	Rani Kulo	Pyuthan	12260	10378	22638	25250	2.00	6210	8
15	Gorkhe Kulo	Pyuthan	12260	10378	22638	24449	2.00	6210	8
16	Kwadi Kulo	Pyuthan	12260	10378	22638	24449	2.00	6210	8
17	Chhattis Mauja	Rupandehi	14146	11120	25266	24449	2..33	7280	7
18	Pithuwa	Chitwan	15209	12514	27723	29950	3.00	10472	8
19	Lothar	Chitwan	15209	12514	27723	29950	3.00	10472	11-17
20	Rani, Jamara, Kulariya	Kailali	12768	8459	21227	22925	2.00	9430	5
21	Karjahi	Dang	12260	11120	23380	25250	2..50	7280	9
22	Tedi-Gurgi	Kailali	12768	8459	21227	22925	0.43	9430	1

3.12 Summary

· Internal resource mobilization can be considered a prerequisite for improved O&M of irrigation systems. Internal resource mobilization in FMISs for O&M is substantially higher compared to the water tax of NRs 60-100/ha levied by the government. (It is proposed to increase this tax to NRs 400/ha in some selected systems). Alternative sources and well-articulated procedures must be identified for resource mobilization. . The major activity of many FMISs revolves around resource mobilization internally. Hence, the success of resource mobilization depends on the rules, regulations, norms, values and organizational patterns that have evolved over time and have been internalized by the members of the irrigation systems. The internalization process takes place when the members themselves are directly involved in the evolution of the rules and regulations. Such rules and regulations are made during the general assembly meetings.

In the larger FMISs, they have decentralized organization and operation. FMISs represents a sustained decentralized pattern of organization in Nepal. The central committee and general assembly lay down

12 Cost of production of paddy and wheat is derived from DOA. 1996. Cost of production of cereal crops (Paddy, Maize, and Wheat) in Nepal, Kathmandu; DOA, Economic Analysis and Statistics Division.

13 Inflation correction factor is given in the Annex.

only general rules and regulations. The sub-units would undertake the application of these rules and regulations. All these sub-units participate in the intake maintenance and main canal desilting. However, each unit would make its own rules and regulations for resource mobilization, basis of water distribution and conflict resolution. These rules and regulations may differ from sub-unit to sub-unit. The sub-units are accountable to the central committee. The resources would be mobilized on the basis of the sub-units. The head of the sub-unit is made responsible for this purpose. The examples are from Chhattis Mauja, Pithuwa, Karjahi, Rani, Jamara, Kulariya, and Tedi-Gurgi systems.

The institutional framework of the FMIS provides the direct method of generating resources for irrigation management. It has autonomy for labor or cash mobilization. This system provides the FMISs control over the use of resources generated from the beneficiaries. Commonly, resource mobilization principles are agreed upon in the general assembly of the system. Fixed amount of cash or labor days except in few systems is not normally prescribed. Work to be done for the year is assessed and the mobilization of labor for O&M takes place accordingly, each year. Provisions are made to meet emergency situations and to mobilize labor to repair the system. Labor specialization in jobs such as record keepers, secretary, labor leaders, local leaders, measurement person, messengers etc. .develops
among the workforce.
It is clear that FMIS treats the whole of their serviceable area as a single unit from the point of view of water sharing and resource mobilization. This gives each and every member of the WUA a stake in the management of the system. . The labor te contributed for O&M is not voluntary, but compulsory on the part of the membership. The service area and membership of the system are defined and irrigation water is considered a community resource. The list of landowners, size of the land holding and unit of water right and membership records of the system are maintained properly . Labor mobilization is thus based one or more of the above listed data records. Free riders are not allowed .

There is collective decision making in FMISs. The general assembly makes the rules and regulations. The executive committee implements them. The statement of annual income and expenditure is presented in the general assembly. The members have a right to ask questions. Hence, the executive committee is made accountable to the general assembly. Books regarding the system are made transparent.

In most of the FMISs, labor is the most important resource of the system. However, in some systems, maintenance is contracted out for cash payment. Cash has replaced labor mobilization due to the in the change in the social system. This change is due to the easy accessibility of the market system to the villages e and the fact that many residences of cultivators are away from the command area. In Satrasaya phant of Tanahu, able bodied young people have moved away to Pokhara, Kathmandu or Narayanghat for employment, so the system had to adopt the contract system for O&M and was forced to mobilize cash per unit of land to pay the contractor. In Damka of Gulmi, residences of the cultivators are away from the command area so cash was mobilized to pay the contractor for O&M. In some systems, a water mill was installed by the irrigators to earn cash income to supplement the O&M expenses like in Thulo Kulo of Chherlung, Palpa.

In many systems, cash is collected as a fine when the members fail to contribute labor or other obligations. In some systems, such amount would be paid to the employees of the system like in Chhattis Mauja. The remaining amount of the money would be kept in the reserve fund of the system. Such funds would be kept in the custody of the chairman or the secretary. In other schemes , there is no system of reserve fund. Whatever amount is collected as a fine would be spent at the end of the agriculture season either on feast or distributed among the members who have put extra effort in the maintenance of the system. Such a system is more prevalent where cultivation is often done through sharecropping. The system with majority of the landowners have made efforts to make investment for improvement. Further investment through internal resource mobilization is dependent on relationship of cultivators on land.

Flexibility of rules and regulations is one of the important features of the FMISs. In a system, one sub-system follows one set of rules for resource mobilization, while in anotherr sub-system an entirely different set of rules would prevail

Farmers seek government assistance to reduce labor contribution and make the system reliable for delivery of water. The government is now playing the role of a facilitator in promoting the FMISs. Periodic government assistance has become important due to depletion of forest products used for O&M. New construction materials are also beyond the reach of the farmers financial capacity. Insystems, where assistance was provided by the government,, annual labor contribution by the farmers has reduced substantially. The government now plays the role of a facilitator to help farmers take over the responsibility of managing the system and to assist in maintaining the sustainability of the FMISs.

Chapter IV

Findings of Case Studies of Selected Irrigation Systems in Nepal

Following the review of resource mobilization practices in FMISs in general, this chapter presents findings of selected case studies of the following irrigation systems. Detailed descriptions can be found in the respective annexes. T

- Aandhi Khola Irrigation System
- Bangeri Irrigation System
- Chhattis Mauja Irrigation System
- Kankai Irrigation System
- Marchwar Lift Irrigation System
- Nepal West Gandak Canal Irrigation System
- Pithuwa Irrigation System

4.1 Background of the Cases

Bangeri and Chhattis Mauja are examples of farmer-managed irrigation systems. Kankai is jointly managed and is in the process of gradual management transfer. The other four: Nepal West Gandak, Aandhi Khola, Pithuwa, and Marchwar are systems where management has been transferred. .

All these systems have good accessibility except Bangeri, which relies on seasonal mud road. Aandhi Khola irrigation system lies in the hills of Nepal whereas the other six systems are in Terai and inner Terai.

All irrigation systems have been providing irrigation service for more than 20 years except Aandhi Khola and Marchwar, which started delivering water in 1996 and 1991 respectively. Pithuwa and Nepal West Gandak systems have completed major rehabilitation programs recently (in the last three years). Bangeri, Chhattis Mauja, and Pithuwa systems have been developed solely for irrigation purposes with very little support from agricultural programs whereas the others have been developed with such support.

River sources of Aandhi Khola, Bangeri, Marchwar, and West Gandak irrigation systems are in regime (stable) condition, whereas river sources Kankai, Chhattis Mauja and Pithuwa have problems of meandering and retrogression (unstable) . Pithuwa and Chhattis Mauja have no permanent type diversion structures.

Considerable portions of the canal network are lined in cases of Marchwar and Kankai, where as the remaining have mostly earth canals. West Gandak, Pithuwa, and Chhattis Mauja suffer from silt deposition in the canal network. Aandhi Khola also faces landslide threats along its canals.

According to the Nepalese classification by size of the command area , Aandhi Khola and Bangeri are considered small systems, Pithuwa is medium, and the rest are large systems. . All have soils suitable for diversified agricultural cropping.

Water control is better, with a larger number of regulatory structures in Marchwar, Aandhi Khola, West Gandak and Kankai schemes compared to Pithuwa, Bangeri, and Chhattis Mauja irrigation systems.

In terms of water adequacy, Pithuwa, Chhattis Mauja, and Bangeri can deliver adequate amount of water in the entire command area for only one season, whereas the rest are in a position to do the same for two or more cropping seasons.

Similarly, water reliability in Kankai, West Gandak, Marchwar, and Aandhi Khola is good and can deliver water reliably in the entire command area, whereas the rest can provide reliable water supplies only in the head reaches. From an equity point of view, Kankai, Marchwar and West Gandak are inferior to the rest.

Ethnically, all the cases other than Aandhi Khola have multiethnic composition. Brahmins dominate in Aandhi Khola (more than 75%).

Aandhi Khola, Bangeri, Marchwar, and West Gandak irrigation systems have ancient settlers while immigrants dominate Chhattis Mauja, Kankai, and Pithuwa. Aandhi Khola shows a trend of out migration while Chhattis Mauja and Pithuwa are still getting immigrants from the hills. In the rest of the cases, the migration trend is insignificant. None of the cases suffer from substantial deficit in the availability of necessary agricultural labor force.

Residents in all the cases are dependent on agriculture as alternative income generating opportunities are very limited.

Water Users Associations in all the cases are legally recognized. Complete financial record keeping and organizational checks and balances are maintained in Aandhi Khola, Bangeri, Chhattis Mauja, and Pithuwa systems while only partial record keeping is maintained in the other systems.

Average landholding size is small in all cases. It varies from 0.24 in Aandhi Khola to 1.3 ha in Chhattis Mauja command area. The percentage of tenants varies from almost non-existent to 20% in Nepal West Gandak. Both formal and informal tenants exist and the tenancy type is mostly sharecropping in all cases.

In general, in all cases, crop coverage and cropping intensity in winter inclusive of cash crops have been be increasing in the last few years. This is due to improved market facilities and relatively easy access to needed agricultural inputs. However, Aandhi Khola faces some marketing problems for its agricultural produce.

4.2 Irrigation Service Fee Related Terminology

Various local terms such as 'Share', 'Sinchai Sewa Shulk', 'Paanipot', 'Paani Sewa Shulk', etc. refer to the service charge levied for irrigation water use. Though different terminology is being used in different irrigation systems, the notion is the same – the charge levied on canal water use for irrigation purposes.

4.3 Resource Mobilization for Financing Operation and Maintenance

4.3.1 Assessment of Resource Mobilization Requirements

There is no well-articulated mechanism for assessing annual resource requirements for O&M in any of the cases studied. This is because they do not prepare any detailed plan of action for O&M. However, for budgeting purposes, recurrent O & M expenditure based on past experiences, are used as base costs. . In

the case of Chhattis Mauja, if requirement exceeds the previous estimation, the WUA mobilizes the additional labor input using the rules of 'dobbar', 'jhara' etc. Bangeri and Pithuwa also adopt a similar process. The following Table 4.1 provides details of annual resource requirements for O&M in the systems studied.

Table 4.1: Operation and Maintenance Requirements

Irrigation System	O&M costs (NRs/ha)	Remarks
Aandhi Khola	1,064	
Bangeri	115	
Chhattis Mauja	573	
Kankai	1,537	
Marchwar	1,782	Excludes farmers' contribution
Nepal West Gandak	187	For irrigated area of 9000 ha. Excludes farmers' contribution
Pithuwa	117	

4.3.2 Assessment of Delivered Irrigation Service and Corresponding Fees

The process for assessing the delivery of irrigation service varies from case to case. For instance, in Aandhi Khola, there is no defined process for assessing the delivered irrigation service. Water is delivered on the basis of individual's share @ 0.025 lps/share, as demanded by individual shareholders. Once the water is delivered, the person is assumed to have received the demanded irrigation service. In the case of the jointly managed Kankai irrigation system, delivered irrigation services are assessed in terms of irrigated area for rice crop. Similarly, in Marchwar, there is a flat charge to a person who has land under the irrigated command. In Chhattis Mauja, it is charged to the WUG (based on *Kulhara*) that falls under the command. In West Gandak it is assessed in terms of irrigated area per crop for maximum of two main crops. Pithuwa also follows the principles of Marchwar. No distinctions were were made for different uses of irrigation water or for different crops in any of the cases.

The different ways of assessing the delivered irrigation service are summarized below:

Table 4.2: Assessment of Irrigation Service and Corresponding Fees

Irrigation System	Basis for estimating ISF	Rates
Aandhi Khola	Per share per season	Fixed rate based on pre-transfer assessment by AKWUA
Bangeri	Irrigated land area	Prorated to O&M requirements
Chhattis Mauja	Water share defined by outlet size	Prorated to O&M requirements
Kankai	Irrigated area under rice	Cash rate fixed, labor prorated to O&M requirements
Marchwar	Irrigated area for the maximum coverage in a year	Fixed rate
Nepal West Gandak	Irrigated area per crop for maximum of two crops	Fixed in West Gandak. Prorated to O&M requirements in Piparpati and Parsauni
Pithuwa	Irrigated area in a year	Prorated to O&M requirements

4.3.3 Relation between Resource Mobilization and Irrigation Service

In general, in all irrigation systems, resources are mobilized from the recipients of the irrigation service. However, the extent varies from one case to another. For instance, Bangeri, Chhattis Mauja, and Pithuwa fully rely on the resource contribution from their beneficiaries to meet the O&M costs of the irrigation

system. Dependency on alternative income sources is minimal. In other words, the resource mobilization efforts are highly dependent and closely tied with the irrigation service. Aandhi Khola also planned to cover O&M costs by mobilizing resources from the irrigation beneficiaries but it has not been very successful in meeting the collection targets. Kankai and Marchwar are progressing remarkably well in this respect. However, the present rates of resource mobilization are not sufficient to meet the entire O&M costs. West Gandak is highly dependent on alternative income sources such as trees along the service road, road tolls, rentals, etc. The proportion of income from alternative sources accounts for almost 60% of the total income of the WUA.

4.3.4 Forms of Resource Mobilization

Considerable variation was found in the mode of payment of service fees in different schemes. . The degree of flexibility in the mode of payment was also found to vary between schemes. In general there are three modes of resource mobilization in the schemes studied, e.g. cash, labor, and kind. A comparative summary is given in Table 4.3 below:

Table 4.3: Forms and Modes of Resource Mobilization

Irrigation System	Cash	Kind	Labor	Flexibility to pay in different forms
Aandhi Khola	Yes	No	No	No
Bangeri	Yes	Yes	Yes	Yes
Chhattis Mauja	Yes	No	Yes	No
Kankai	Yes	No	Yes	Cash is the must, but the labor portion can be paid in form of cash
Marchwar	Yes	No	No	No
Nepal West Gandak	Yes	No	Yes	No
Pithuwa	No	No	Yes	No

4.3.5 Relation between Irrigation Service Fees and Water adequacy, Reliability, and Equity

In general, it is seen that resource mobilization efforts have been more successful where water is delivered adequately, reliably and equitably. However, the effects of these factors are not the same. Equity in water distribution has been found to be most sensitive compared to water reliability, while water adequacy is the least affected. . For example, in Bangeri, Chhattis Mauja, and even Pithuwa, resource mobilization efforts have been successful in meeting full O&M costs even though farmers do not get adequate and reliable water supplies from the source. Nevertheless, they have been able to maintain equity in water distribution.

4.3.6 Farmers' Willingness to Pay

It is often argued that willingness of farmers to pay ISF is closely related to their ability to pay, which is usually reflected in terms of incremental net benefit from irrigation. However, WUAs with better organizational capacities have been more successful in collection efforts irrespective of incremental net benefit from irrigation. From the case studies, it can be observed that the farmers' willingness to pay for ISF or associated resource contributions also varies from scheme to scheme. . For example, in Aandhi Khola where irrigation cost is NRs. 900/ha (5.7% of the gross incremental benefit), farmers were willing to pay this amount without hesitation. On the other hand, in West Gandak, where the rate is only NRs. 60/ha/crop, heavy reliance is placed on alternative sources of income to meet O&M costs. The main reason for this is that the organizational capacity to collect assessed ISF and to apply needed sanctions is better in AKWUA as compared to the WUA in West Gandak to. ISF rates in different schemes are given in Table 4.4 below:

Table 4.4: Irrigation Service Fee Rates

Irrigation System	Rate (in NRs.)	Remarks
Aandhi Khola	450/ha/crop	for a maximum of 2 crops
Bangeri	115/ha/year	Annual labor mobilization
Chhattis Mauja	573/ha/year	Annual labor mobilization
Kankai	100/ha/crop	for rice crops only
Marchwar	180/ha/year	
Nepal West Gandak	60/ha/crop	for a maximum of 2 crops
Pithuwa	117/ah/year	Annual labor mobilization

From the available data it is difficult to make any assertion about what rate is most justifiable. The prevailing costs in different irrigation systems are based on the required O&M costs and not on the net incremental benefit from irrigation. In jointly managed irrigation systems like Kankai, the rate fixed by the government is far less than what is required for recurrent O&M cost.

Regarding modes of payments, no trends were observed among the schemes studied. Flexibility to pay ISF in any form does not necessarily promote higher collections. However, it is very clear in cases like Chhattis Mauja and Bangeri that the labor contribution is vital as irrigation services depend very much on substantial labor mobilization.

4.3.7 ISF Collection Mechanism

The ISF collection mechanisms, especially cash collections and/or penalties, etc in different schemes are summarized in Table 4.5 below:

Table 4.5: Cash Collection Mechanisms

Irrigation System	Who collects?	When collected?	Where kept?
Aandhi Khola	WUA with help of office staff	No defined time	Bank account
Bangeri	Local influential political leaders	During nursery for paddy, i.e. in Jestha (mid June)	No cash balance is kept
Chhattis Mauja	WUA Treasurer	Before next year's water delivery	Bank account
Kankai	Lower committees	By Jestha	Bank account
Marchwar	WUA main committee with the help of its hired staff	By Jestha	Bank account
Nepal West Gandak	Lower committees	By mid November for monsoon and by mid May for winter crops	Bank account
Pithuwa	Branch committees	Within a year	Bank account

Evidence from case studies suggest that, the organizational level of the WUA most concerned with the water delivery and having the most contact with beneficiaries are more successful in collecting ISF compared to others further away. . The best time for collecting ISF for delivered services is just prior to the delivery of water during the main season.

Transparency in ISF collections and expenditures were seen to be crucial for developing mutual trust among beneficiaries and for raising collection efficiency. Accordingly, many of the irrigation systems keep the collections in jointly operated bank accounts and submit expense statements at general assembly meetings. However, irrigation systems, such as Bangeri have tried to sustain trust among farmers by spending the entire ISF collection on the O&M of the same year. By leaving a zero cash balance at the end of the year, the chances of misappropriation of the collected fund are minimized..

Supporting rules, regulations, and authority to collect ISF all lie with the respective WUAs and are encoded in the respective constitutions of the WUAs. All WUAs are formally registered with the government of Nepal. In practice however, many of the organizations are not enforcing all the rules.

4.3.8 Means for Controlling Free Riders

The most efficient means of controlling free riders has been through cutting off water supplies to non-payers. In cases where this is not feasible for individual outlets, because of insufficient water control , the whole hydrological block is denied water. In addition, ostracism has also been successfully adopted for controlling free riders in the Bangeri system. The system also offers incentives such as the first irrigation service to the first ISF payer.

4.3.9 Utilization of Collected Fees

The mobilized resources and O&M costs in the different schemes are given below:

Table 4.6: Operation and Maintenance Cost and Resource Mobilization

Irrigation System	O&M costs (NRs./ha)	Resource mobilization (NRs./ha)	Remarks
Aandhi Khola	1,064	258	Six years' average for 282 ha irrigated area
Bangeri	115	115	Two years' average for 200 ha irrigated area
Chhattis Mauja	573	573	For 3500 ha irrigated area
Kankai	1,537	701	Inclusive of labor mobilization worth NRs. 671/ha and NRs. 30/ha by other means. Five years' average based on data till May for 7,000 ha irrigated area
Marchwar	1,752	29	Three years' average for 2815 ha irrigated area
Nepal West Gandak	187	15	Five Years' average till March for average of 9,000 ha irrigated area
Pithuwa	117	117	For 618 ha irrigated area

All the collected proceeds in case of Chhattis Mauja, Bangeri, and Pithuwa are used for financing O&M costs of the respective systems. Aandhi Khola pays some portion of it towards loan repayment. In other irrigation systems, respective WUAs have started similar processes but have been successful only to a limited extent.

4.3.10 Arrears and Dues

Basically, no irrigation system allows the writing off of arrears unless it is verified that the individual farmer has not received the irrigation service for which he has paid.

The assessed ISF has to be paid by a specified deadline. If the deadline for payment of irrigation service fee passes, the amount becomes arrears and stands against the person unless it is paid.or. In such cases, some penalties are also added to the previous due.

In jointly-managed irrigation systems too, ISF payment should be made within a given deadline. If payment is not made t within the specified time (Chaitra masaant/mid April), the person is charged a penalty of up to 10% for a further period of time (till Jestha masaant/mid June). If the person defaults during the second period, the arrears become government dues and will be collected from the individual as per government

rules. However, the responsibilities for collecting such government dues are not clear and the government has not been able to do anything concrete in this regard.

Chapter V

Issues Related to Irrigation Service Fee in Nepal

It is widely accepted that the performance of ISF collection in irrigation systems managed by DOI in Nepal has not been satisfactory. A probe into the reasons for this low performance has revealed that there are weaknesses in implementation but more serious is that there is no clear-cut policy in this regard. These policy issues can be broadly divided into three categories: one relates to the principles of ISF, the second to the mechanism of ISF collection, and the third to the utilization of the collections. This chapter discusses some of the major issues including legal issues and analyses possible options.

5.1 Policy Issues on Principles of ISF

Some of the pertinent questions that need to be answered in this regard are as follows:

Should ISF be imposed at all?

In AMISs, the farmers are not in favor of ISF collection. They opine that the government should grant the service free of charge. Moreover, the amount collected at present is so low that the expenditure required for the collection process can sometimes exceed the actual amount collected. Under the circumstances, one may raise the question as to whether ISF should be imposed at all. On the other hand, it can be counter-argued that the advantage from a system of ISF collection is not limited to collection of money. It enforces social justice by making those who avail of any facility to pay for it. Thus, beneficiaries are not exempted at the cost of others. Moreover, the very act of contributing develops a "sense of ownership" towards the system. Hence, an ISF scheme, if properly implemented, would have positive impacts on long term sustainability of any irrigation system. Furthermore, once the policy issues have been resolved and an appropriate mechanism for ISF collection established, the collection process would become cost effective and efficient. Based on the above theoretical arguments and some empirical facts from Nepalese experience, one may conclude, that in the context of Nepal, it would be advantageous to implement a system of collection for irrigation services.

Should ISF be determined on the basis of cost incurred in the construction and maintenance of irrigation infrastructure or on the basis of benefit delivered to the farmers?

Since the benefits received by the farmers and the costs incurred are not the same for all projects, it is generally argued that the charge imposed must be on the basis of benefits obtained (in the form of increased productivity and overall production). Although the argument is sound, estimation of benefits of irrigation in monetary terms is a more difficult than the determination of costs. Moreover, spatial and temporal variations of benefits are much higher.

Despite the difficulty in assessing benefits from the point of view of social equity, the basis of benefit delivered is more rational. The Affordability Index[14] as internationally approved is 3% of the net benefit.

14 Affordability indicates the capacity of users to pay the irrigation service fee. It is generally expressed in percentage of the amount to be paid as ISF against the net incremental benefit from irrigated agriculture.

The question is how to adapt this to the Nepali context. Some efforts have been made in this direction in some of the FMISs (See Box 5.1).

Box 5.1: ISF Collection on Benefit Basis: Examples from FMISs

Initially the farmers of Sota Kulo of Damka (Gulmi district) maintained their irrigation system by mobilizing labor at the rate of one person per household but this method did not work well as most of the farmers did not live within the command area. A better method, of giving on contract the regular maintenance of the system was then introduced. . In order to raise money they decided to collect ISF on the basis of agricultural production. Presently the rate of ISF e collection is NRs 4.50 per *muri* (60 kg) of rice production. According to the farmer leaders of the system, collection of resources on the basis of production protects the small and poor farmers. It incorporates many other considerations such as quality of soil, availability of water, etc.

A similar system can also be observed in Phalebas. The only difference is that the irrigation committee has worked out ranges of production. A farmer with 1-10 muri rice production has to pay NRs. 80, those getting 10-20 muri have to pay NRs. 120 and those with production above 20 muri have to pay NRs. 190.

Should ISF be determined to cover only recurrent costs (cost of operation and maintenance) or recurrent and replacement cost (cost of rehabilitation works) or all recurrent, replacement and capital cost?

In Nepal, at present, there is no consensus on what proportion of the O&M costs should be contributed by the beneficiary and what proportion borne by the government as a subsidy. Even though the present irrigation policy is not very explicit in this matter, there are indications that ISF should be aimed at O&M cost recovery through either increased direct farmer management of the irrigation system or increased water charge. However, O&M cost is also considerably high. See Box 5.2 for the scenario of O&M cost expenditure of different types of irrigation systems presently under the DOI.

Box 5.2: Review of O&M Costs of Government-Managed Irrigation Schemes

Annual O & M cost of most large projects in the terai is above NRs. 400/ha/year. The Project Operation Plan (POP) of SMIP assumes an annual maintenance budget requirement of NRs. 769/ha in 1995/96 decreasing steadily to NRs. 510/ha by 1999/2000. At this time it is expected that all canals serving areas less than 1000 ha would be handed over to Water Users' Committees who would undertake the O&M of these smaller canals. Similarly, POP prepared by NZIDP assumes an annual maintenance budget of NRs. 831/ha in 1994/95 diminishing steadily to NRs. 470/ha by 1999/2000. Here too it is assumed that all canals serving areas less than 1000 ha will be handed over to Water Users' Committees who would undertake O&M. As per NISP feasibility report, the incremental O&M cost for surface irrigation schemes is NRs. 950/ ha per year.

The O&M cost of ground water projects is even higher. As per feasibility report of Birgunj Groundwater Project the O&M costs of DTW and STW are NRs. 3,570 and NRs. 2,948 per ha respectively.

A study of the budget allocation by HMG over the last 4 years for O & M of irrigation systems was completed. The study revealed that the average budget for surface, lift and groundwater schemes are NRs. 374, NRs. 1,308 and NRs. 2039 per hectare respectively and the overall average is NRs. 1,353/ha.

In this context the present HMG rate of ISF is very low. See Box 5.3 for the review of Water Charge Rates imposed by the government.

Box 5.3: Review of Rate of Water Charge Imposed by the HMG

Previously, water charges were collected along with the collection of land revenue. The farmers who received irrigation facilities had to pay more land revenue. The category of land would be promoted to irrigated land as soon as irrigation facility was made available. Later, in the 1950s, water charge was separated from land tax. Up to March 1977, the rate of water charge fixed by HMG according to the 'Financial Act 2030' was NRs 9.75 /crop/ ha (i.e. NRs. 6.50/crop/Bigha for Terai and NRs. 0.50 / crop / Ropani for valley and hilly area). On the 24th Falgun, 2033 (March, 1977) the government published a notice in the Gazette on water charge, its rate, collection method and the time of collection. Through this notice the rate was increased to NRs. 60/ crop/ ha (i.e. NRs. 40/crop/Bigha for terai and NRs. 3.08 /crop/Ropani for valley and hilly area). The notice states that the above rate will be valid for all irrigated area except in the case of projects executed by a Board, which has been given the authority to change the rate. No change has been made in the rates in projects directly under HMG since 1977. However, in projects executed by the Board, the rates have been revised at different periods. For example in the case of SMIP, the issue of raising water charges was brought up in the 44th meeting of the SMIP Board held on 3/3/2043 (June, 1984),on a request made by the World Bank. At this meeting, it was explained that " water charge rate was much higher in areas where intensive irrigation facilities were available. e.g. in tube well irrigated area in Narayani Project the rate was NRs. 100/ ha / crop and in Bhairahwa Lumbini Groundwater Project it was NRs. 200/ ha/ year". But before deciding on a new rate, the Board decided to wait for the results of the 'Impact Study of Stage 1 Upgrading Works' which was then being carried out. It was in the 51st meeting held on 22/4/2044 (August, 1985) that the Board decided to increase the water charge from the previous NRs. 64 /ha to NRs. 200/ha. This was explained to be necessary to bring uniformity as similar projects under a Board had raised their water charge to NRs. 200/ ha/ year.

Unfortunately, the present rate of collection by DOI even at a low charge is extremely poor. A study of ISF collection by HMG in the last 3 years has revealed that the collection has been less than 2% of the average annual O&M budget over the last 4 years. Thus, it can be concluded that the question of capital cost recovery from the farmers is not possible at this point of time. The major concern of the government is to recover at least the recurring cost of O&M of irrigation systems.

On what basis should ISF rate be fixed?

The ISF rate can be based on a range of criteria. (See Box 5.4). . In selecting an appropriate criterion, one must have in mind that the greater the precision of the method of estimation the more equitable would be the charge. However such precision would require greater effort both in terms of technical accuracy and manpower. Thus, policy should determine the basis for valuing water and the desired level of accuracy for assessment.

Box 5.4: Basis of ISF Rate Fixation

ISF can be collected on any one of the following basis:

1. Irrigable Area (irrespective of whether the farmers use water or not).
2. Irrigated Area Annually (irrespective of cropping intensity).
3. Irrigated Area in each Crop Season (irrespective of crop cultivated).
4. Irrigated Area and Crop Cultivated.
5. Duration of Irrigation Supply (ensuring that the discharge in maintained within a fixed range).
6. Number of Times of Irrigation.
7. Discharge Delivered (irrespective of season).
8. Discharge Delivered varying with season.
9. Discharge Delivered varying with crop.
10. Discharge Delivered varying with the utility of the water.
11. Volume of water use (irrespective of use).
12. Volume of water use varying with the use.

The pricing structures are sequenced in such an order that the most accurate method comes last. In Nepal, the 2nd and 3rd pricing structures in the above list have been observed in practice.

Should one price be fixed for ISF throughout the nation or should ISF vary from one irrigation scheme to another r?

It is obvious that the cost (and benefit) of one irrigation scheme will vary from one scheme to another. Thus, if cost (or benefit) is to be made the basis of ISF, the price will vary accordingly. The government policy in this matter should be clear whether each system should have a different price or that an average value for the whole nation is to be levied for all schemes.

An intermediate way may be sought by making it a district/region subject or by classifying schemes on the basis of source, reliability of supply, water quality, etc. and fixing one rate for each category. A system of annual increment with the market price may also be fixed. The tariff can also be made up of two parts: one part being fixed (e.g. demand charge in BLGWP) and the other varying with the amount of water used.

5.2 Issues Related to Mechanism of ISF Collection

Who should collect ISF? Should the irrigation agency only collect ISF or should the authority also be delegated to others?

In Nepal, the decision as to who (agency or person) should be responsible for the collection of ISF has been controversial. ISF has been like a fireball that no one wants to accept. Please see Box 5.5 for the different agencies made responsible for ISF.

Even up to now, different people have different opinions as to which agency or person should be made responsible for the collection. Some think that it should be done by DOI as it is the main organization responsible for irrigation service delivery. Others opine that the responsibility of both the fixing of the rate and collection, should be shifted to DOA as they keep records of yields and incremental benefits from water. Some others opine that Ministry of Finance should be entrusted with this responsibility as they do all the revenue collection and ISF is also a type of revenue. Presently, with the growing understanding of the need to decentralize authority and responsibility, VDCs are emerging as the most promising

organization to be made responsible for the collection as they also collect land tax according to the new arrangements. Which agency should be made responsible is again related to the policy issue of how the government perceives ISF. However, it is quite rational to state that if farmers keep all the collections, government's involvement is not needed.

Box 5.5: Agencies Responsible for ISF Collection

After the poor achievement of ISF collection by the then Department of Irrigation, Hydrology and Meteorology (DIHM) a notice was published by HMG in 1977 and the responsibility of ISF collection was shifted to the Land Revenue Office under the Ministry of Land Administration. ISF was tied up with land tax and it was reasoned that with this arrangement, good collection would be made. As the Land Revenue Office (*Mal Tatha Kosh Tahasil Karyalaya*) already had the land data and the necessary setup for collection, both the taxes could be collected simultaneously. However, since ISF was collected on the basis of irrigated area and the preparation of annual records of irrigated area was the responsibility of DIHM, it resulted in dual responsibility. The delay on the part of DIHM in sending records hampered not only ISF collection but the collection of land tax as well. Thus, the Land Revenue Office refused to collect without the provision of additional staff. The responsibility was transferred back to DIHM. With the endorsement of Irrigation Regulation of 1988, the responsibility of ISF collection in areas where WUAs had been formed was transferred to the respective organizations. Since assessment of irrigated area can be done more accurately by the users, , this provision in the regulation must be considered as a positive one. However, it has been felt that the executive members in WUAs must be well-trained on financial and administrative management.

How should ISF be collected?

Some people believe that there should be a fixed place (e.g. Project Office or WUA Office) where the farmers could come and deposit their payments. Others opt for the formation of a 'Mobile Collection Team' for the purpose of collection. Some farmers even opine that the account number of the bank account for ISF should be given to each farmer and they should be asked to deposit their payments in this account. This method may be adopted after the farmers have already developed the habit of timely deposition. However, in the present context, the collection rate is so low that collection through mobile collection team seems to be more appropriate.

Generally in FMISs, there exists flexibility in terms of how ISF should be e deposited. ISF may be deposited in terms of cash, kind or labor. These three are easily convertible and the conversion factor is determined by the WUA. However, in AMIS, collection in the form other than cash may result in many f complications and hence is not allowed.

When should ISF be collected?

ISF collection can be done throughout the year. But it has been observed that the farmers deposit the money only during certain times usually after the harvest of the main crop. Irrigation Regulation 1988 specified the time of collection. Collection can be done once or twice a year. Time and labor can be saved by planning the collection during a a fixed period. (the time period would depend on the number of farmers involved). The best times appear to be either soon after the main crop if collected once a year or after the end of each crop season if collected more than once a year.

What should be the most appropriate incentive structure?

If the process of collection is to be expedited there must be a proper incentive structure for both the farmers paying ISF and the collector. Suggested incentives for the farmers could be the delivery of water on the basis of `first pay first serve" as in Bangeri Irrigation System, or provision of discount for paying in advance and penalty for late payment. Similarly, incentive for collectors could include the payment of certain percentage of the collected amount.

5.3 Issues Related to Utilization of ISF

Should the entire ISF collection be deposited in Water Users' Associations own fund or should part be deposited to the general revenue fund of the national treasury? In the latter case, what proportion of the collection should be deposited?

This issue is closely linked to whether a significant amount is collected as ISF and whether the government's objective is to recover capital cost. If the objective is only to recover O&M expenditure, the WUA should be allowed to make use of the total amount collected, provided that the government does not have to bear any further expenditure and the money collected is used solely for maintenance of the system. In this case, they should also be granted the authority to fix their own rate of ISF. Complication arises in schemes under Joint Management where both WUA and the government contribute for O&M. In this case the percentage that should be deposited to the national treasury should depend on the extent of the share of O&M responsibility taken over by the WUA. The new Irrigation Policy has tried to establish such an incentive system to promote irrigation management turnover. Please see Box 5.6 for the provisions made by the First Revision of the Irrigation Policy.

Box 5.6: Provisions for ISF (from Annex 3 of `Irrigation Policy 2049, First Revision 2053')

Details of Participation:	ISF Collection Provision: % kept by HMG	% kept by WUA
1. O&M of water courses and below by WUA and the rest by HMG	75	25
2. O&M of irrigation blocks by WUA and the rest by HMG	50	50
3. O&M of all canals and command area except the main canal WUA and the rest by HMG.	25	75
4. Main canal and the total command area except the head works by WUA and the rest by HMG	10	90

Should the government dictate the rules and regulation concerning the utilization of the share of ISF belonging to the WUA or should it be totally left to the discretion of the WUA?

Some are of the opinion that, once the O&M responsibility of the systems that have been turned over has been assigned to the WUA., this organization should be given complete authority to fix rates, collect and utilize the fund as deemed necessary by the WUA. , Others in favor of return of capital investment suggest that they should be made to deposit some amount (however small) to contribute towards capital cost recovery. Many voiced doubts as to whether the amount collected would be properly utilized by the WUA. They feel that the accounts of the WUA should be audited annually and rules and regulations must be formulated to ensure the proper utilization of the money collected.

Should the WUA be confined to ISF collection or allowed to diversify collection by other means in order to cover the costs of O&M? Should the ISF collection be used for other purposes ?

According to the case studies, a few WUAs have tried to diversify their sources of income. e.g. those of Marchwar lift, West Gandak, etc. Examples include; fee for canal road use, fee for project asset use, charge on equipment, lease of public resources, etc. These additional sources of income to be used for O&M expenditure of the irrigation system. However, from the experiences of FMISs in Nepal it can be concluded that for long term sustainability and stability of financing, ISF collection should be directly related to O&M expenditures. Reliance on income from other sources and the use of ISF for other purposes should be kept to a minimum.

5.4 Legal Aspects of ISF in Nepal

This section deals with the legal aspects of ISF in Nepal. It outlines the chronology of Laws and Policies that have been promulgated over time. It looks at important features of existing laws and policies . Finally, it analyses the existing legal framework and aspects related to financing irrigation service and their implications.

5.4.1 Chronology of Laws and Policies Related to ISF

The HMG has, since the early 60s, been formulating policies and laws related to Water Charge or Irrigation Service Fees. The chronology of policy and laws related to the topic is given in Box 5.7 below. Basically it can be considered as a charge for the use of water, but both the terminology and concepts have changed over time. Terminology like water charge, water cess, etc. was used initially, particularly when it was used as a means of revenue generation for the government. Presently, the terminology `irrigation service fee' is widely used and has been defined as a fee to be paid by the direct beneficiaries of irrigation services.

Box 5.7: Chronology of Laws and Policies in Nepal Related to Irrigation Service Fee

1963 (2018 B. S.) Promulgation of the *Irrigation Act, 2018* to provide legal provisions concerning water use, construction and maintenance of canals, distribution of water, collection of water charges, sewerage etc.
1967 (2025 B. S.) Introduction of the *Irrigation, Electricity and Related Water Resources Act, 2024* to provide legal provisions related to irrigation, production of electricity and other matters concerning water resources.
1968 (2026 B. S.) Commencement of the *Irrigation, Electricity and Related Water Resources Act, 2024.*
1974 (2032 B. S.) Introduction of the *Canal Operation Regulation* to govern water use for irrigation.
1988 (2045 B. S.) Adoption of a new working policy on irrigation development by HMG.
1988 (2045 B. S.) Enactment of the *Irrigation Regulation, 2045* to provide legal provisions for formation of water users' group, water distribution, realization of water charge etc.
1990 (2046 B. S.) Publication of list of water resources and irrigation systems or projects to which the *Irrigation Regulation, 2045* is applicable.
1992 (2049 B. S.) Adoption of the *Irrigation Policy, 2049* to clarify the government's policy in this field.
1993 (2050 B. S.) Commencement of *Water Resources Act, 2049.*
1993 (2050 B. S.) Introduction of the *Water Resources Regulation, 2050* to provide for the procedures of the Water Resources Act, 2049.
1996 (2053 B. S.) First Amendment of *Irrigation Policy, 2049* made by HMG.

Among the above list, Water Resource Act, 2049, Water Resources Regulation 2050 and First Amendment (2053) of Irrigation Policy, 2049 are valid at present.

5.4.2 Important Features of Existing Policy and Laws

Features of Irrigation Regulation, 2045

The Irrigation Regulation, 2045 under the Irrigation, Electricity and Related Water Resources Act has made provision again for water tax collection from the irrigation systems. This regulation will be applicable to both irrigation systems constructed and implemented by HMG or by Development Committee Act, 2013. The regulation has made elaborate provisions for water tax collection and spelt out elaborate procedures for collection of water tax.
These include :

a) The irrigation officer concerned is made responsible for water charge collection, assessment, tax exemption and punishment of defaulters,
b) A water tax record should be prepared. The concerned irrigation officer shall do the exclusion or inclusion in the record.
c) The water tax rate shall be determined by HMG.
d) Water tax shall be collected on an annual basis
e) Usually, the landowner shall pay the water tax. However, the tenant could pay the water tax where Tenancy Right has been enforced.
f) Water tax collection unit shall be established in each system.

Features of Water Resources Act, 2049

The Water Resources Act, 2049 has vested the ownership of all the country's water resources in the state. The Act has established a hierarchy of need for water utilization and set up the state as the licensor of water use. It has also mentioned that a charge or annual fee, as prescribed by HMG, has to be paid by the licensee for utilizing water resources.

The Act has also states that the licensee may make available services generated out of the use of water resources developed on its own to any other person on the basis of mutual terms and conditions and realize the charge in consideration of such services rendered to them. In the case of water resources developed by HMG, the Act has stated that the service charge should be fixed as prescribed and shall be realized in consideration of services rendered to them. The Act has further added that the services to such person may be stopped for those who are in default of payment of charge for the utilization of services and for those who utilize the services abusively or misuse the services or act in contravention of the terms and conditions.

In the section on the power to make rules, the Act has listed the government's ability to make rules on matters relating to fee, charges etc. payable to the HMG for the utilization of any service related to water resources.

Features of Water Resource Regulation, 2050

The Water Resources Regulation, 2050 has been framed by HMG using the power mentioned in Section 24 of the Water Resource Act, 2049. This regulation devolves the power to recognize licensed users and resolve water disputes at the district level. Rule 8 of WRR, 2050 has made provision for one "District Water Resources Committee" in each district, under the chairmanship of Chief District Officer (CDO), and comprising of the following members: representative from district level Agriculture Development Office, Forest Office, Drinking Water Office, Irrigation Office, Electricity Project Office of HMG, office relating to utilization of water resources, District Development Committee and Local Development

Officer.

Article 5 of the WRR has been specially devoted to 'Service Fees'. Rule 29 states that any individual or group who obtained the license and wants to distribute irrigation services on a commercial basis, has to pay to the HMG an annual water license fee according to the following table:

Table 5.1: Annual Water License Fee for Irrigation

Area to be Irrigated	Fee
To irrigate area up to 2000 ha.	NRs. 1,000
Area 2,000 ha – 5,000 ha	NRs. 2,000
Area 5,000 ha – 10,000 ha	NRs. 5,000
Area 10,000 ha – 15,000 ha	NRs. 10,000
Area 15,000 ha – 20,000 ha	NRs. 15,000
Area 20,000 ha – 25,000 ha	NRs. 20,000
Area 25,000 ha and above	NRs. 25,000

Rule 30 discusses the fixation of rate for the services. It states that in the case where HMG has developed the water resources, a committee will be formed for the determination of the rate *Service Fee* and the *extra charge* for those who do not pay in time.

The committee, as it has been stated, will consist of the following:

1. Person assigned by HMG - chair
2. Person among the water users assigned by HMG - member
3. Person assigned by HMG - member

The rule further adds that the committee will fix the service fee considering the following criteria:

1. Capital investment depreciation rate or amortization.
2. Net benefit received by the users.
3. Canal operation and maintenance expenditure.
4. Changes in consumers' price index.

Features of Irrigation Policy, 2049 (First Amendment 2053)

The first amendment of the Irrigation Policy is very much in line with the decentralized autonomous financing of the management and operation of irrigation schemes. In the section on Irrigation System Turnover to the WUA, the policy clearly states that HMG will not collect ISF in surface or ground water schemes that have been turned over to the WUA. It also adds that the respective WUA can collect ISF from its beneficiaries as per the operation and maintenance need of the scheme.

It has also made provision for sharing of collected ISF between government and the WUA depending on the extent of participation of the WUA in the O&M (Please, refer to Box 5.6).

5.5 Analysis of the Existing Legal Framework and Its Implications

Experience with the existing policy and legal framework has revealed that there are some shortcomings that have to be overcome for the smooth implementation of ISF collection. These shortcomings mainly concern the necessity for clarity in some matters regarding ISF and some contradictions between the policy and the laws.

The following are some of the comments:

- No clearly defined principle of water pricing has been stated in the existing policies and law. Reflections on all the following principles can be observed:

    1. "Water as a Commodity".
    2. "Return of Investment in Water".
    3. "O&M Cost Recovery".
    4. "Taxation on Benefit from Water".
    5. " No charge on Water".

Confusion has been created for example by the four different criteria that have been mentioned in the Water Resources Regulation. Since it has been decided in the ISF Study Working Committee Meeting that ISF should be for total O&M cost recovery, this needs to be clearly stated in the existing policy and the laws.

- Many provisions in the existing legal framework (especially, Water Resources Act, 2049 and Water Resources Regulation, 2050) have not yet been brought into practice. Considering the practicality of the statements of these laws, they have to be reviewed. Those sections that are important and practical have to be enforced and those that are impractical have to be modified.

- The existing Policy has many details that should actually have been in the Irrigation Regulations.

- Details regarding mechanism of collection cannot be found in the existing rules and regulation. Similarly, the role of the ISF fixation committee needs more elaboration.

- Many details were available in the *Irrigation Regulation, 2045* but since that Regulation was formulated under the *Irrigation, Electricity and Related Water Resources Act, 2024* an urgent need has been felt for a new irrigation regulation.

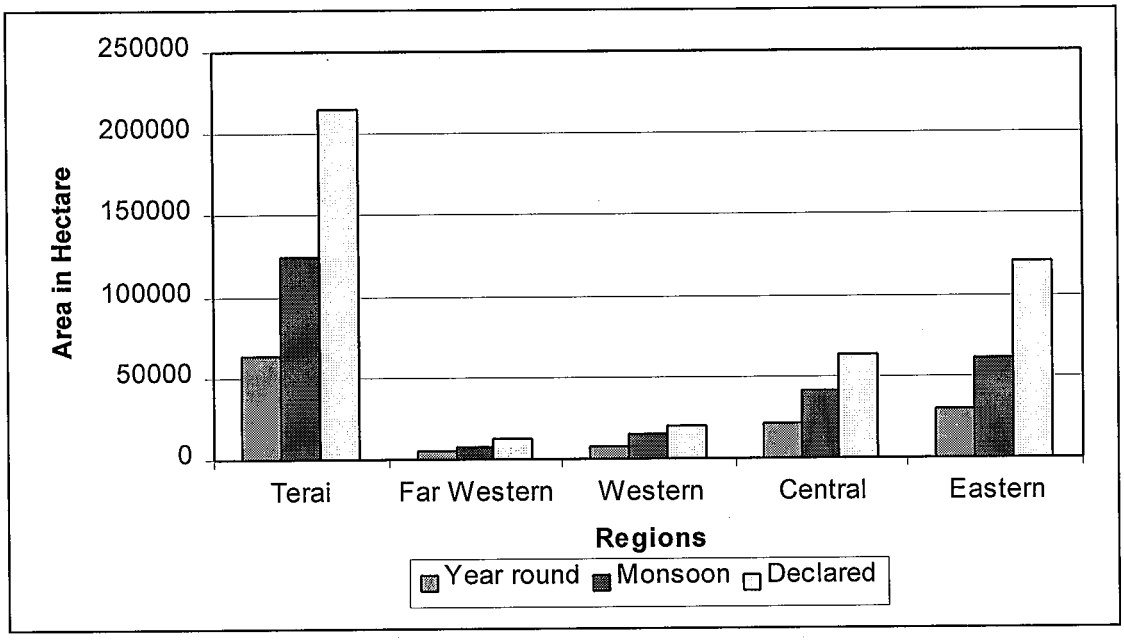
- The Policy mentions that ISF will be charged for each season whereas there is no rule stating the rate for each season.

- Since WUA has been recognized as the major institution responsible for the collection and utilization of ISF, clear cut legal provisions have to be made for the empowerment of the WUA with regard to enforcement of ISF. Rules should also define the authority of WUA so that the collected amount is properly utilized.

5.6 Declared versus Actual Irrigated Areas

Among other issues, the differences between declared and actually irrigated areas have also been a matter of concern. Often, the agency-declared irrigated areas are taken as the basis for targeting the ISF collection figures. However , large differences were observed between the actual and declared areas. It is estimated that only 60% of the command area gets irrigation water during the monsoon season and only about 30% have year round irrigation facility. There is tremendous scope for increasing the service area by improving operations. Effort must be made to increase the service area or improve the performance of the system by providing water to the declared service area. There is still a big gap between the command area and actual service area. Additionally there are seasonal variations in cultivated area. Please, see the chart below).

Chart 5.1: Declared and Achieved Command Area of Major Surface AMISs



Source: S. N. Poudel and C. K. Sharma. 1994. Agriculture Perspective Plan, Technical Paper on Irrigation and Water Control, Vol. 1 prepared for HMG, NPC, and ADB by APROSC, Kathmandu.

5.7 Revision of ISF

With an encouraging picture of ISF collection in only a few selected systems, the overall gap between the ISF contribution and O&M requirement is large . There is a need for an upward revision of the Irrigation Service Fee.

The O&M cost requirements differ from system to system and by type of technology . The Water Resources Act also makes the provision that the WUA of the relevant irrigation system shall determine the ISF rate. The WUAs can play an influential role in determining the rate and drawing up arrangements for the collection of ISF. It will be a more practical step if each system fixes its own rates for ISF depending on the system's characteristics.

When estimating O&M requirement, factors affecting costs and possibilities for cost reduction should be taken into consideration. Further, one should also consider the farmers' capacity to pay in determining

the rates, particularly the profitability of irrigated agriculture, which is the main source of income. . It is assumed that irrigated agriculture more profitable to farmers compared to dry land agriculture. Incremental benefits in some irrigation systems are summarized below:

Table 5.2: Net Income from Irrigation Systems

Name of the system	Crops Grown	Net income /ha	Year of Estimation
Post Command Area Systems	Rice and wheat	NRs. 6446	1982
Khageri system	Rice , wheat and other crops	NRs. 6423	1993
Pithuwa system	Rice , wheat and other crops	NRs. 6874	1993

Source: Information is collected from Small, et. al. Financing Irrigation Services, Colombo: IIMI. p. 167 and information on Khageri and Pithuwa is adopted from Naresh Pradhan. 1994. Technical efficiency, Institutional analysis and transaction cost of Public Irrigation Systems under farmer and government management in the Terai of Nepal, Manila: University of the Philippines at Los Banos (Unpublished Master's Thesis).

Keeping in mind the incremental (net) income from irrigated agriculture, the farmers should be able to pay a higher rate of ISF. The present rate on average is only 1% (NRs. 60/ha) of incremental(net) income from irrigated agriculture, The ISF should be adjusted according to the farmers' capacity to pay.

The other important aspect is the need for maintaining financial autonomy of the irrigation systems. The WUA should be able to fix the ISF rate and utilize the collections for the betterment of the irrigation systems. This requires that the present system be modified so that ISF collection need not be deposited in the Consolidated Fund of the government.

Chapter VI

Local Initiatives for Addressing the Irrigation Service Fee Issues

In the course of this study, a two-hour meeting of the working team was jointly organized by RTDB and IWMI in which about twenty people from different sectors participated (Pl. refer to annex 8 for the list of participants). The purpose was mainly to develop a common understanding of the issues related to ISF in Nepal and to build up a common vision for taking necessary measures to address them. Also, the intention was to seek input from the people at policy as well as at implementation levels in the course of the study itself.

The meeting was held on Wednesday, July 15, 1998 (Ashadh 31, 2055) at the Seminar Hall of the DOI, Jawalakhel, Lalitpur. The meeting commenced with the opening remarks of the Director General, DOI. Dr. K. R. Sharma, RTDB Chief, briefed about the planned study on ISF. A brief overview on subsidiary studies on Irrigation Service Fees in Nepal was given by the study team members: Dr. Prachanda Pradhan, Suman Sijapati, and Krishna C. Prasad. Following the overview, participants were asked for their perceptions on various issues related to ISF in Nepal. The issues that were presented for discussion and related suggestions are presented below:

6.1 Key Issues

The discussed issues focussed on the following:

- Anomalies related to different but related terms of irrigation service fees: water cess, irrigation fee, water charge, water tax, etc.
- Appropriateness for calling it "ISF" or "water cess" or should it be "management fees"?
- Financing irrigation management tasks such as operation, maintenance, monitoring, evaluation, etc. in jointly managed and turned over irrigation systems.
- Role of ISF in self-reliance, local governance, and sustainability of the WUA and the irrigation service itself.
- Need for an increased understanding of effective ways of ISF fixation and collection, and its use under a set of given irrigation management attributes.
- Is ISF a form of government revenue or just the service charge in line with current Irrigation Policy?
- Division of responsibilities and jurisdictions between the government and the WUA regarding ISF collection rates and withholding, etc. related to the extent of management transfer.
- Appropriate ISF rates, basis of assessment , and collection mechanisms pertaining to types and locations of irrigation systems.

- Concern over arrears and dues.
- Conceptual relationships among government subsidies, management transfer, farmers' obligations, and irrigation service fees.

6.2 Suggestions from Discussion of the ISF Working Team

The perceptions and suggestions that came out of the active discussion of the participants are summarized below:

- ISF to be treated as a "Service Fee" and not as a "Tax"
- Major part of O&M costs to be borne by ISF
- Alternative income sources and use of ISF should not undermine the irrigation service and thereby, the efforts towards improving agricultural production
- No government subsidy for normal O&M activities.
- No capital cost recovery through ISF
- O&M costs, ISF rates, and collection mechanisms be ascertained on system-by-system basis under the joint efforts of the WUA and the agency staff at the project level
- Payments of ISF to be made immediately after receiving the irrigation service
- Process for waiving the previous arrears should start at the project level
- The recommended mechanism to be enforced from the date of endorsement

Before the meeting adjournment, the date and plan for a subject specific one-day workshop on Irrigation Service Fees in Nepal was also discussed.

6.3 Workshop on Irrigation Service Fee

RTDB and IWMI, to present and discuss findings of the ISF study and to seek pertinent and effective recommendations for improving irrigation service fee scenario in Nepal, jointly organized a topic specific one-day workshop (List of participants and detailed program are given in annexes 9 and 10, respectively). The outcome of the workshop that may be taken into account while refining the existing policies and related rules and regulations for financing the O&M costs in irrigation systems of Nepal is discussed below.

In the workshop, in addition to presenting the findings of subsidiary studies, intensive group discussions were held on various aspects of ISF. The participants were grouped into three groups and were given specific sets of concerns to come up with appropriate answers. The three main topics and associated questions were as follows:

Topic 1: Assessment of O&M Requirements and Corresponding ISF

Concerns:

1. What kinds of activities and associated costs should be considered as Regular and Recurrent O&M costs?
2. What should be the principles and mechanisms for assessing the O&M requirements in an irrigation system?
3. When and how much time would be needed for regular O&M activities?
4. How should the assessed O&M costs be met?
5. What should be the principles and mechanisms for assessing the delivered irrigation service by the irrigation system?
6. What principles and processes should be adopted for pricing the delivered irrigation services?
7. Should there be a minimal flat rate?

The expected outputs from the group discussion on the above matters were as follows:

- Appropriate principles and processes for estimating annual and recurrent O&M costs
- Principles and processes for assessing irrigation service delivered to individuals
- ISF pricing principles for meeting the O&M costs

Topic 2: ISF Collection Mechanism

Concerns:

8. Can WUA be the best ISF collector?
9. How should ISF be collected?
10. When should ISF be collected?
11. In what form should ISF be collected? – Labor, Kind, Cash, or others
12. How can full transparency in collections be maintained?
13. Should there be flexibility to make payments in different forms?
14. Should VDC(write in full) be involved in collection efforts?
15. What obligations would Department of Irrigation have?

Expected outputs:

- Appropriate ISF collection mechanism
- Means of maintaining transparency in ISF collections
- Possible collaborations with other local entities

Topic 3: Empowering WUA for ISF Collection

Concerns:

16. How can the WUA be made accountable for ISF collections?
17. How can the WUA control free riders?
18. How should the WUA collect arrears?
19. How can it be ensured that the WUA will utilize the ISF collections to finance the O&M costs?
20. What additional authority does the WUA need for becoming more effective?
21. What legal backing does the WUA need?
22. What additional incentives could be given to the WUA?
23. Will any training or orientation help in technical and institutional aspects?

Expected Outputs:

- Measures to be taken to make the WUA accountable for collecting the ISF

- Means for empowering the WUA for effective collections
- Ways of making the ISF collection efforts by WUA an incentive rather than a chore.

Recommendations of the Workshop

The recommendations that came out of the group discussions in the workshop related to above topics are given below:

Topic 1: Assessment of O&M Requirements and Corresponding ISF

1. The scope of works under O&M should include all the works from head to tail and the command area that have been created under the project (headwork, canals, canal structures, and other facilities). Operation costs should include salary and wages of all staff, office expenses, overhead charges, operation of gates and outlets, painting and greasing of gates, cost incurred in the collection of water service fees, etc. Similarly, maintenance should include regular maintenance works that can be planned in advance and emergency repairs excluding catastrophic/calamity damages. Deferred maintenance would not be considered for ISF determination as it is already accounted for, but not done and accumulated.

2. In systems under joint management, O&M requirements should be assessed separately for different systems depending on their specific characteristics and scope of O&M works. The agency officials and the relevant WUA/WUG should jointly make assessment after closure of canals, at least twice a year.

3. The assessment of repair and maintenance works should be completed within one week of the closure of canals. In larger systems, the assessment for the entire system should be completed within one month.

4. The major portion of O&M costs should be covered by the ISF. The agency's component of O&M should be paid by cash. , For O&M works in the turned-over areas, payments can be made by cash or any combination of cash/kind/labor.

5. Regarding principles and mechanism for assessing the delivered irrigation service within the system, the following is proposed. For cultivation in rainy season, the net command area should be delineated on the ground and on a map and a flat rate charged per hectare of land within the command area... For other crops, ISF should be charged on the basis of actual irrigated area under the said crop. For this purpose, WUA/WUG should provide details of irrigated areas under different crops to the agency management. For deep tube well cultivation, the charge should be determined on volumetric or hourly basis .

6. A desirable pricing system would be to charge a certain percentage of net 1 benefit as ISF, on the principle that no system would be built unless there are positive net benefits from the system. . Under the prevailing circumstances in Nepal, only the annual O&M cost can be covered by the ISF. The total amount required for O&M could be raised as follows.:

- 70% from flat rates for rainy season
- 30% from the rates fixed for actual irrigated areas in rest of the seasons

For each scheme, the proportions suggested above may have to be adjusted according to the conditions of the scheme

Topic 2: ISF Collection Mechanism

7. The WUA should be the collector of ISF, as it has relevant experience and provides direct service to the farmers. However, it should also be given the legal authority as well as the necessary training. The WUA must be established in schemes where it is not in existence at present.

8. ISF should be collected from the recipients of irrigation service only. Rates should be different for different crops. It should be collected by the WUA representatives or WUA-appointed persons in respective branches/tertiaries.

9. ISF should be collected in Poush (Mid December) for rainy season crops and in Jestha (Mid May) for winter crops. Appropriate penalty and incentive mechanisms should also be developed.

10. Transparency should be maintained by keeping up-to-date records by publishing notice of people who have paid and not paid,. regular auditing and obtaining approval for financial statements, from the general assembly.

11. Help should be sought from local VDCs and records of irrigated and un-irrigated land area should be made available to VDC offices. VDCs and the WUA could draw up an agreement on collection efforts and fix the share to be given to VDC if needed.

12. DOI should provide the required training to the WUA officials, water to farmers when required in the case of jointly managed irrigation systems, legal recognition to the WUA, block maps to the WUA, and help WUA in getting various support from agriculture related agencies.

13. If the schemes are not fully transferred , WUA should deposit the stipulated (See Box 5.6) share of ISF in the bank account specified by the government by the end of Ashadh (Mid July).

Topic 3: Empowering WUA for ISF Collection

14. In relation to empowering the WUA for ISF collection, a clearer perspective should be developed on following actions that would improve the status of a WUA:

- Legitimizing the autonomous status of WUA by formulating necessary laws and by-laws
- Establishing a self guided, self regulated, self governed and sustainable organization (for example, through generating reserve funds for emergencies)
- Promulgating laws to protect the rights and duties of the WUA
- Ensuring transparency of WUAs and establishing procedures for better accountability of their activities.

The above suggestions have been used as the main basis for the recommendations made by this study.

Chapter VII

Irrigation Service Fee: A Discussion

This chapter presents a discussion on financing of regular O&M tasks in fully or partially transferred irrigation systems. The discussions are based on related literature, case studies of fully and partly transferred systems and FMISs. and evidence from other countries.The outcome of discussion meetings, workshop group discussions and recommendations on ISF and ongoing debates over the issue of financing O&M activities in irrigation systems, are also presented in this chapter.

7.1 Financing of Irrigation Services

In many developing countries including Nepal, large investments were made in the irrigation sector during the 1970s and the 1980s. Consequently, the resources required for the operation and maintenance of the developed infrastructure increased substantially. , Most countries have been unable to finance these expenditures adequately. Provision made by government or other agencies for this purpose has declined considerably in recent years due to budgetary constraints, and is likely to decline further or be discontinued altogether in the future. However, it does appear to be irrational to allow irrigation facilities to deteriorate at a time when agricultural productivity is increasing with improved technology and complementary inputs. . Many governments in developing countries are formulating policies towards harnessing additional resources for funding irrigation O&M through farmer payments and their participation in O&M of the system. This concept is being applied in irrigation systems through what is generally referred to as the "Management Transfer" approach..

7.2 Shift in Financing Mode through Management Transfer

The management transfer policy in many countries has been accompanied by a shift in the responsibility of financing the irrigation costs . The shift in O&M responsibilities through management transfer programs, essentially, means a shift in financing mode for O&M activities. It is either the state or the beneficiary farmers themselves, who have to finance the O&M costs.. In agency-managed systems , the state is expected to finance the O&M costs of the irrigation system. Similarly, in management transferred irrigation systems, farmers are expected to finance the O&M costs. . In jointly managed systems, farmers together with the state, have to co-finance O&M activities.

In Nepal, "transfer of O&M responsibilities", has been synonymous with "management transfer" programs. Nevertheless, the state, as envisaged by the irrigation policy, does not intend to completely shed its responsibilities from the fully transferred irrigation systems. In principle, even after full management transfer, the state is expected to continue its support in various ways, such as reconstruction after a catastrophe, technical support for introducing innovative technology, credit and marketing support for agricultural produce, etc.. The main objective of management transfer , as envisaged by the irrigation policy, is to induce beneficiary farmers to manage and finance the normal O&M activities. in return for irrigation services. Thus, management transfer could be interpreted as a change in the management mode as well as a shift in the responsibility for the O&M of the system.

7.3 Irrigation Service Fee

ISF has been globally accepted as one of the major sources of financing expenditures in irrigation. In addition to generating revenue, the imposition of a service fee for irrigation would reinforce the principle of social justice in the irrigation sector With water having a price attached to it , farmers would consider irrigation water as an economic input like other agriculture inputs. Consequently, they would use water more rationally resulting in conservation of water and improved efficiency in water use. . Willingness to pay for irrigation services is also an expression of confidence of the farmers in the management of the system (irrigation project)and their satisfaction with irrigation supply. Thus, ISF collection efficiency can also be used as an indicator of irrigation system performance.

7.4 Principles of ISF Rate Fixation

Principles governing ISF Rate

There are different schools of thought relating to the principles of water pricing and the basis for determining the ISF rate. They are as follows:

1. "Water as a Commodity".
2. "Return of Investment in Water".
3. "O&M Cost Recovery".
4. "Taxation on Benefit from Water".
5. "No Charge on Water".

All these principles are plausible. They can be graded down from a more capitalistic approach to a more socialistic approach. The choice of a particular principle or a particular combination of principles depends on the government's objectives of irrigation development and how it fits in to the national development effort. The policy decision should match the socioeconomic context of the country with the pricing principle.

Criteria for ISF Rate Fixation

Consideration may be given to the following three interrelated criteria in determining ISF rates.

1. Cost Recovery.
2. Benefit from Irrigation.
3. Farmers' ability to Pay.

The principle of full cost recovery of both capital and O&M of irrigation systems is seldom applied in recovery of ISF from users. In almost all countries subsidies are provided to cover a portion of irrigation costs. In developed countries, O&M and a proportion of capital costs are recovered. . In developing countries only a part of O&M cost is recovered. . In developing countries there is a wide variation in cost recovery but the typical pattern is a total subsidy on capital cost and partial subsidy (of varying degree) on O&M costs. However, a shift in policy with respect to cost recovery can be observed in the developing countries including Nepal. The new policy emphasizes full recovery of O&M cost and partial recovery of capital cost. The approach has been to initially recover the O&M costs and then gradually recover capital cost.

Though the approach is very clear, its application has posed some problems. In most cases the output from the irrigation project is much lower than that projected in the feasibility reports. This is generally due to the accumulation of defects starting right from design through construction to operation and maintenance[15]. In some cases, it has resulted in actual benefit cost ratio that cannot be justified on economic grounds[16]. The question might then be posed as to why users should bear the unjustifiable costs, particularly the capital cost.

Assuming that costs have been estimated accurately , farmers may not be able to pay if incremental benefit from irrigation water is less than the fee charged. . It is in this context that the benefit criterion should be considered along with the cost criteria to determine the rate of ISF. However, there are drawbacks in applying the benefit criteria. . Firstly, the calculation of incremental benefit of water for each individual is a difficult task. Since irrigation water is combined with other inputs to produce output, it is more difficult to isolate the effect of irrigation separately. Secondly, irrigation water provides benefits not only to the direct water users but also indirectly to other sections of the society. It is pertinent to ask why only farmers should be charged for the use of irrigation water?

Users of irrigation services may still be subsistence or marginal farmers, despite having access to irrigation, and thus unable to pay ISF. Therefore the economic status of such farmers should also be kept in mind while applying the "ability to pay" criterion for setting ISF rates.

The other issue is related to mobilization of public savings and equity. Subsidies generally tend to encourage inefficiency in the utilization of scarce resources. Subsidized resources are consumed without considering the true cost to the society. Governments may also see beneficiaries of major public investments as capable of contributing to public revenue that is needed for investing in other development projects. Moreover, the concern for equity may influence a policy that favors subsidies to the poorer segments of society. However, it is very difficult to direct the benefit of subsidy only to the target group. Consequently, everyone including large farmers and big entrepreneurs, benefit from the subsidy. Often, it brings s only minimal benefits to the targeted group.

Political feasibility and administrative capability play an important role when it comes to revising irrigation service fees upwards. Subsidies are often popular with the politicians A higher ISF rate may face stiff resistance from farmers and politicians. At the same time, the lower rates may cost more to collect than the revenue it generates.

Considering the above issues, a gradual process must be evolved by which the irrigation service becomes fully financed by the recipients of the irrigation service.

7.5 Pricing Structure: Suman's Option Matrix

The fee, will encourage farmers to be more efficient in their use of water, if structured in such a way that the farmer's total water bill will vary according to his water use decisions. In reality, most systems of ISF are not structured in this manner, in the developing countries.

Essentially, there are three dimensions to the selection of a pricing structure. The first is the basic unit for measuring the delivered irrigation service, second is the time interval for assessing the delivered irrigation services, and the third is the type of use of irrigation water. In each of these dimensions, various options exist. Measurement may be based on irrigable area, irrigated area, supply discharge or supply volume.

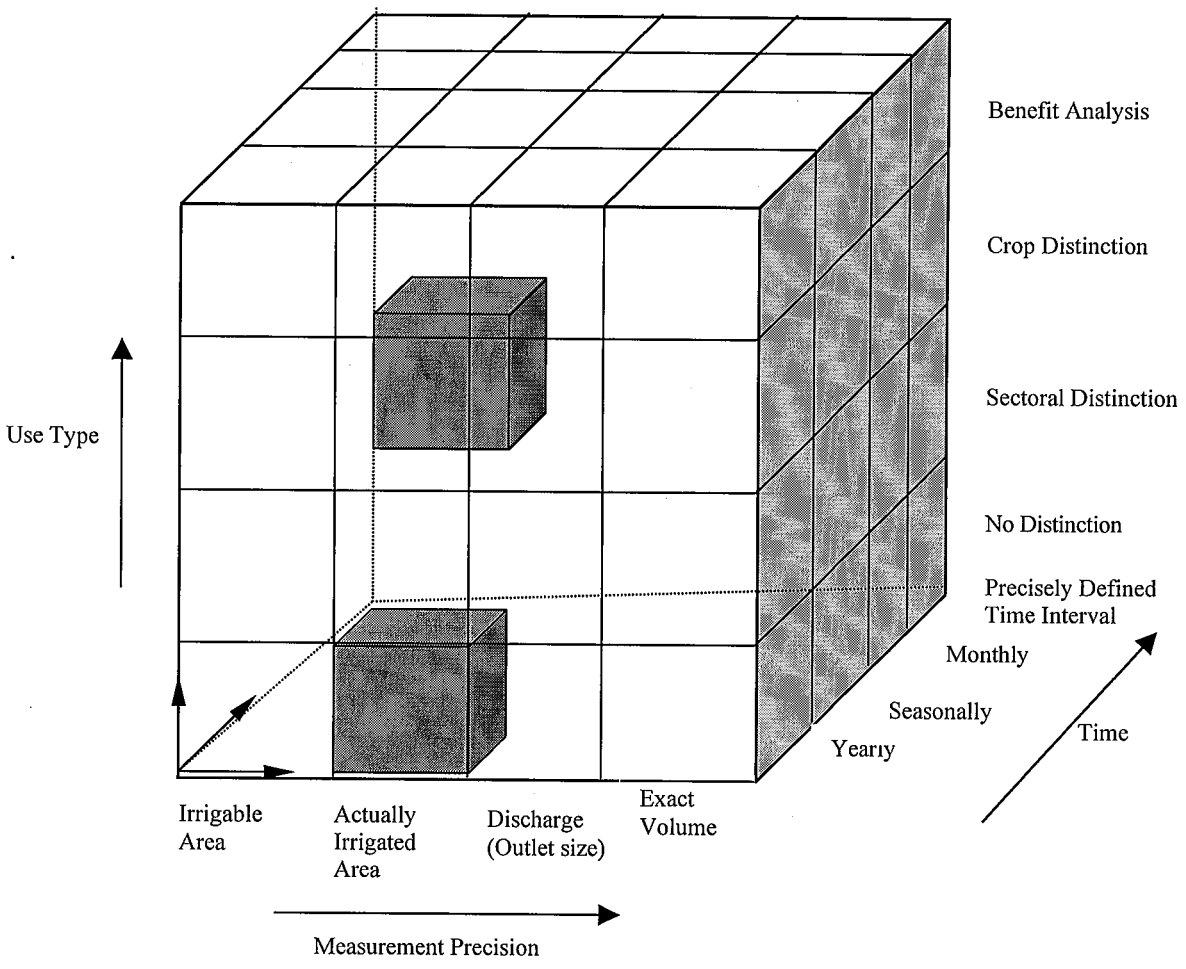
[15] For various reasons, farmers feel that the allocated resources have been misappropriated and do not reflect the real cost.

[16] This has been illustrated by numerous impact studies of irrigation projects in many developing countries.

With respect to to the time dimension, the options include, period of a year, season, month or a shorter time interval (e.g. day, hour, minute or second). Thirdly, the type of use, can be categorized into different uses such as consumable or non-consumable, or by sector such as agriculture , fishery or recreational use. , by type of crop being irrigated, or by quantum of benefit derived from irrigation water. Suman Sijapati has developed a matrix called Suman's Option Matrix, on the basis of this conceptual framework..

The sequence of the options in each dimension is ordered from less to more precise in terms of measuring the delivered irrigation service. A trade-off exists between precision and cost of assessment and associated collection. Greater the precision of assessment, the higher the probability of improving collection efficiency and therefore the collections. Greater the precision of assessment , the higher is the associated cost of ISF collection. Therefore the option selected must strike a balance between the cost of collection and the desired level of accuracy in measurements.

Suman's Option Matrix



7.6 Authorized Agency/Person for Rate Fixation

In general, it has been the responsibility of the government to set the ISF rates. However, with the growing acceptance of the participatory irrigation management approach worldwide, the beneficiaries are getting increasingly involved in this process.

7.7 Assessment of Resource Mobilization Requirements

As observed in fully transferred irrigation systems, the respective WUAs have a very good idea of the required O&M costs for operating the irrigation system and to continue providing an uninterrupted irrigation service. It is often based on previous experience with budgetary expenses during the phase of joint management and after management transfer. In general assemblies, all WUAs are required to submit details of budget and how the resources would be mobilized. Farmers also know that O&M costs would be less than what the state used to spend in the system. However, figuring out ways of meeting the estimated cost has been the biggest concern for the WUAs. The tendency has been to raise the required resources from non -irrigation service related activities such as rentals, trees along the canal network, road tolls, fishing along the canal system and at the headworks.

7.8 Collection Process

Developing cost-effective procedures for collecting small amounts of money from a large number of farmers is a major challenge to the collecting agency. Passive procedures, such as waiting for farmers to come to a central office to pay their fees, are not likely to be very effective. Repeated visits to farmers may be required. Visits may need to be timed to coincide with the sale of irrigated crop, as a farmer may lack cash to pay the fee both before the crop is sold and shortly thereafter. In some cases, collection in kind, rather than in cash, is encouraged in order to improve the rate of collection. However, this entails much greater administrative and handling costs. Experience with collection in kind has shown that farmers often pay their fees with wet, low quality grain, creating costly storage and handling problems for the collecting agency.

7.9 Incentive Structure and Enforcement

Active collection efforts are an important element of government's enforcement procedure. But enforcement has to go further than this. Unless some type of reward/punishment system is imposed, the credibility of the system of ISF collection is likely to be undermined leading to reduced collection.

7.10 Problems Encountered

Problems encountered in ISF collection in most developing countries are similar. One major problem faced by most countries is that, physically on the field, it is very difficult to implement a "no pay – no water" policy because of the prevailing design and construction of irrigation systems. The second problem is regarding the accuracy of the data of delivered services as researches have revealed significant discrepancy between irrigated, planted and billed areas. Thirdly, the method of fee collection is costly, lengthy and provides little incentive to the collectors. In many countries e. g. Bangladesh, Nepal, Pakistan, etc., the collections go to the government treasury and are not related to the O&M budget. Therefore , the agency has no incentive to increase collection efficiency.

7.11 Some International Evidence

The financial sustainability of WUAs and more generally, of the organizations responsible for management of water whether user-based or government, is clearly one of the most difficult issues being faced by a number of countries inclusive of Nepal. In essence, it involves a strategy for financing the irrigation service that encompasses issues of water pricing and collecting water charges. With the advancement of management transfer programs worldwide, farmers are increasingly being asked to pay for O&M cost of the irrigation schemes from which they receive the irrigation service. However, principles and methods of pricing water and collecting water charges are not the same in all countries and have varied from case to case. With the view of giving some valuable insights on this topic, this chapter presents some international examples and cases that may help in recommending appropriate and sustainable principles and methods for financing the irrigation service in Nepal's jointly managed and management transferred irrigation schemes.

Albania

Recent reforms and bankruptcy of the previous government have made many irrigation systems non-functional. The rehabilitation of these schemes is being undertaken with assistance from a World Bank loan. The new WUAs are hoping to be financially self-sustainable by financing O&M costs through fees collected from the beneficiary farmers.

Argentina

In Argentina, the funds for the DGI (General Irrigation Department) are derived from the collection of irrigation water rates that users pay. Water rates are established by the DGI's Administrative Tribunal, which has the power to impose taxes and draw up the budget.

Bangladesh

The Bangladesh government has been gradually reducing its subsidy on irrigation with the objective of easing budgetary pressures and to increase efficiency. The present policy is to recover O&M cost from gravity irrigation systems and to recover both investment and O&M cost from minor irrigation systems (which include DTW, STW and LLP). Until June 1976 no fee was levied. Although an ordinance imposing ISF of 3% of the gross incremental benefits was promulgated in 1963 and given effect in 1976, it was not effectively implemented. In 1983 the government promulgated another ordinance, under which a flat rate per acre per crop season was fixed for each project.

Asad Uz Zaman (1990) reports on the cost-recovery program experience of the Barind Integrated Area Development Project in northwestern Bangladesh. The key features of this project (which are different from others in Bangladesh) are:

- irrigation service is formally guaranteed to participating farmers
- fees to be paid in advance of each season
- the project itself, rather than the government collects the irrigation fees.
- the project retains the fees collected in order to pay salaries and other operating expenses, and invests any surplus in order to generate additional income
- incentives are provided to farmers for prompt payment of fees and penalties are imposed for delayed payment.

From the outset, the goal of the project was full recovery of operating expenses and capital costs, that is to be "financially self-driven by generating income through cost recovery from water conveyance for irrigation and meeting all cost for O&M" (Zaman 1996, p. 221). This is considered to be sustainable. However, in 1989 only one-third of the cost was collected. This shortfall was due to the fact that irrigated area per tube well remains considerably below assumed potential. But for the area actually served and billed, more than 90% of the amount due for each of the 3 years reported was collected (ibid.).

Small-scale irrigation in the project area is primarily serviced by deep tube wells. Farmers organize themselves as a WUA. There are set irrigation charges, which the farmers must pay to the Barind Multipurpose Development Authority (BMDA), with penalties for delay of payment. The tube wells are not operated until the WUA pays the irrigation charges. BMDA pays for repair and spares up to one-third of the full irrigation charges realized. If the cost exceeds the limit, the WUA pays the additional costs. Mechanical services are free of charge. All other operating costs are paid by the WUA (Zaman, 1996).

China

The main goal of the irrigation project in the Wulin Mountains of Hunan Province is also operational self-reliance. The practices, or structures, to achieve this include volumetric wholesaling of water to distribution organizations; farmer water charges with both fixed and volumetric components; financially autonomous irrigation management agencies; delegation of water distribution and fee-collection responsibility to village-based organizations.

Also, there are financial incentives rewarding successful collectors of irrigation fees. The villages handle fee collection. Charges are usually levied on an area basis. The village also primarily undertakes water allocations at the field level. The state serves as a wholesale provider of water.

Egypt

The government does not charge for delivering water to the tertiary level (*mesqa)* but has established a policy whereby the farmers repay a portion of the costs of the *mesqa* improvements being made under the Irrigation Improvement Project. The WUA itself is responsible for paying the O&M costs of their pumps and improved distribution systems, based on user's payments.

India

In India, the current water rate structure owes its origin mainly to the water pricing policy of the British colonial administration. Since the British treated irrigation projects purely as commercial ventures, they devised water rates based on an internal rate of return (IRR), commensurate with the then prevailing interest rate in the London market. The IRR (and hence, water rates) was also revised to account for cost price changes.

Although volume-based approach of pricing canal water was tried twice (in 1854 and 1917), in view of its practical difficulties, the British decided to use area as the main criterion for water rate fixation. However, the area-based rates are differentiated further by factors like crop and season to account for crop and season-specific variations in water requirements. The assessment and collection of these rates, which covered all costs plus a return on capital, were also strictly enforced.

There was a shift in basic approach toward water pricing after independence. Instead of a purely commercial approach, irrigation projects were viewed as instruments of development especially for augmenting income, employment, and food production. Consequently, for project selection criterion, IRR

was initially lowered (in 1949) and later replaced (in 1958) by benefit-cost ratio (BCR). As the minimum BCR used for the selection of irrigation projects was low (1 for projects in drought-prone areas and 1.5 for projects elsewhere), the application of water rates were also kept at a lower level. Despite the change in approach, the area-crop-season-based method of rate determination has still been retained. At present, water is still a state subject and the states fix water rates.

There is wide variation in water rates both across and within states. In West Bengal water rates vary only by season, those in Kerala are changed just in terms of gross area irrigated irrespective of both crops and seasons. In the case of all other states, the area-based water rates are highly differentiated not only by crop and season but also by category of projects, irrigation type (flow or lift), users (private parties, cooperatives, government) etc. Variations in water rates across project categories reflect the quality of irrigation service in terms of its dependability and continuity. While Andhra Pradesh, Haryana, and Tamil Nadu have classified their canals into two, three, and five categories respectively for rate fixing purpose, Bihar and Orissa have distinct rate structure for perennial and non-perennial canals.

Indonesia

In Indonesia, most irrigation schemes are gravity irrigation. Regarding O&M cost recovery, the government provides for the main irrigation systems, while the farmers are responsible for the tertiary level O&M. However, there was no formal charge to farmers for the cost of O&M services. Before independence, there was a land tax for all agricultural lands. As irrigated land had a higher tax rate than rain-fed land, this indirectly recovered a portion of the costs of the irrigation services. But income received from this tax was not identified as being used for financing O&M costs. After independence, this land tax was abolished. However a land-based tax was eventually re-established, but it was not specifically earmarked for O&M costs. Instead it was allocated for rural development activities of district governments. However, indirectly the O&M costs were being recovered by this tax. Thus, cost recovery measures for irrigation O&M were in the form of higher taxes for irrigated lands.

Farmers are required to pay WUAs and the village (desa) government a fee per hectare in cash or in kind to cover the physical and financial aspects of O&M. They are also required to contribute materials for construction and labor, whenever it is required. Even where there are no formal WUAs, farmers often organize themselves at the tertiary level as voluntary labor for cleaning and maintenance of farm-level canals and ditches. Farmers' contributions can often be quite substantial - sometimes exceeding the amount the government spends on main system O&M.

Government groundwater irrigation projects are relatively new in Indonesia. After construction by the government, the expectation is that farmers will be responsible for the O&M. However, there have been problems with this, as the cash requirements for O&M are very high, especially in areas where surface irrigation is available to the farmers at a much lower cost.

The collection of fees from farmers by the WUAs and the village government has not generally been a problem. There is an Act[17] which specifies that, even though water is seen as a basic human need, a " gift from God ", direct beneficiaries of water from the irrigation project should contribute toward the management service cost. So these associations are able to implement this regulation to collect water fees (or 'membership fees') from farmer-members and impose sanctions agreed upon by the farmer-members.

[17] Act No. 11 of 1974, and also Presidential Instruction No. 1 of 1969 which authorizes provincial governments to tax the beneficiaries of an irrigation system to cover the O&M of the system.

Mexico / Colombia

In Mexico, where more than 90% of the 3.3 million ha of publicly irrigated land in the country had been transferred to joint management, WUAs have proven capable of operating and maintaining the modules, even up to sizes in excess of 50,000 ha (Johnson III, 1998).

It is a custom to charge the users the irrigation tariff in advance before they receive the service. This form of charging for this service is an advantage for the WUAs' operation because it permits to have money entries from the beginning of the irrigation cycle.

Water fees collected by the users have not only supported the module O&M activities but also funded most of the O&M activities by agency staff at the main canal and water source levels. However, from a sustainability point of view, it has been felt necessary to change the system of water fees so that the districts develop a reserve fund for emergencies, future replacement, and rehabilitation. Also, a need has been felt to shift to a system where the modules collect a fixed amount to pay the costs of staff and other facilities of the modules as well as a volumetric fee to cover the variable costs of delivering water.

Similar provision exits in Colombia, where water services are billed in two ways:

1) Basic or fixed fee, which is the fee paid by users for each hectare of land serviced by irrigation, and
2) Usage or volumetric fee, which is the fee paid by users for the total volumetric unit of water supplied and consumed at their properties.

These cost recovery exercises in Mexico have not been easy because in many cases the necessary increases were higher than 400%. In 1988, subsidy on O&M was 72%. At present, however, financial self-sufficiency has been attained in most of the transferred districts.

Pakistan

Before the recent reforms, there was no direct connection between irrigation fee recoveries and the budgets of the provincial irrigation departments. Under the new law, it is expected to achieve financial sustainability within 7-10 years. However, political sensitivity has led to assurances that the rates will not be raised in the near future, and a uniform rate will continue to be set and collected by the provincial government. The lack of authority in the new law for local WUAs and Area Boards to set and collect their own fees has been seen as a serious weakness.

Water charges are set by the government, which are different for different crops are as below:

Crop	Rate (NRs./ha)
Sugar Cane	240
Rice	119
Wheat	79
Vegetables	128
Fish Farm	783
Orchard	188
Cotton	126
Tobacco	126

Assessment is done by the "Patwaris" who are under the Irrigation Department on the basis of actual area cultivated under different crops in a season. The records of assessments/bills are submitted to the Civil

Administration, which does the collection. The "Numberdars" take the bills to the irrigators and collect the money. They submit these collections to the "Tehsildars" at the Sub-Division Level. The collections are finally deposited in the government's treasury as tax.

Provisions for penalties for the defaulter in form of "Tawan" (Fine) also exist and "Numberdars" are quite efficient as they can use the police if needed.

Philippines

Recent financial pressures on the national government have led to a reduction in governmental financial support for National Irrigation Administration (NIA), a government agency responsible for irrigation, and thus reduced financial support for irrigation (Small and Adriano, 1989). The Republic Act 3601 as amended has authorized the National Irrigation Administration (NIA) to charge and collect from the beneficiaries of the water from all irrigation systems constructed by or under its administration. Accordingly, NIA has looked for ways to increase its revenues and reduce its operating costs; hence the development of new procedures for improved irrigation fee collection. It has involved the transfer of irrigation management to farmers' associations and the improvement of water distribution to farmers in order to enhance their willingness to pay for these irrigation services. The NIA management created a four-fold strategy in order to balance its costs and revenues:

- Devolve responsibility for some specific operational, maintenance, and fee-collection tasks to farmers;
- Increase corporate revenues by raising fees, improving fee collection, and bring in more secondary income from ancillary activities;
- Reduce operating costs by major cuts in the personnel budget;
- Provide financial incentives for exceptional performance to outstanding field units and individuals.

Although, the actual costs of O&M vary by system, it must charge by a universal rate (and also achieve "viability" which means for each system, expense must not exceed income). The rate is set in terms of kg of rice, but has not been adjusted for some years even though rice prices have dipped down, and other prices are higher; and it cannot use legal means to recover fees from defaulters. However, in order to encourage crop diversification, ISF rate for crops other than rice such as vegetables, tobacco, cotton, corn and sorghum are reduced to 60% of the prevailing ISF rate for rice.

With the increase in irrigation fee rates the collection efficiency dropped to 27% in 1975/76 from 40% in the period 1971/72-1974/75. Gradually, however, collection efficiency increased to 49% in 1984. The total ISF collection increased from Peso 6.4 Millions- 15.6 Millions in the period 1971/72 –1974/75 to Peso 38 Millions in 1977 and to over Peso 98.9 Millions in 1984.

The farmers are given the option to pay in cash or in kind. If the farmers pay in kind , the fee is valued at the prevailing government support price for palay (paddy). The reason why the rates are set in palay as the basis is to have a built-in mechanism to increase the absolute value of the rates when the support price goes up to keep pace with increase in cost of O&M.

The ditch tenders report the area planted to the water master. The water masters check the area, consolidate and submit the report to the billing section for the preparation of bills. Irrigation Superintendents verify these reports. Bills are prepared by billing clerks right after reports on area planted are received. Ditch tenders give prepared bills to the farmers. Some bills are sent to landowners through mail.

The billing clerks prepare a monthly summary report of collection and submit it to the Accounting Division of the Regional Office where Collection Efficiency Reports (CERs) are prepared. The CERs are then submitted to the Treasury Department in the Central Office. Most of the bills are prepared in the second month of transplanting.

Senegal (Delta region)

Following government withdrawal from irrigation, farmers in transferred schemes now have to pay the full hydraulic charges, whereas in non-transferred schemes, these costs are subsidized (Riddell, 1997)[18]. Farmers pay the hydraulic charges (CFA francs per hectare) to village cooperatives, who manage and maintain water distribution at the village level. In non-transferred irrigation schemes, farmers pay the charges to the SAED, which is a parastatal organization, previously responsible for the whole irrigation sector.. The hydraulic charge covers the following: renting of the group motor pump (small-scale irrigation schemes only); motor fuel and lubrication for pumps; electricity of the pumping station; salary for the pump attendant; maintenance and spare parts (group motor pump or pumping station); amortization (which can be used to pay for small rehabilitation works); maintenance of scheme, and others (e.g. set payment to OMVS for maintenance of main canal(s) and main pumping station).[19] OMVS (an inter-state organization) and the SAED manage and maintain water distribution at the system level.

Major rehabilitation work was carried out by the SAED before the schemes were transferred to farmers. SAED will continue to do large rehabilitation works, while small rehabilitation works will be done by the farmers, – by paying the village co-operatives to undertake this.

Farmers organize themselves within 'economic interest groups' or 'producers groups'. The recommended hydraulic charge for transferred schemes is approximately 100,000 CFA francs per hectare, while for non-transferred schemes it is 41,000 CFA francs per hectare. However, in 1990 the farmers were actually paying on average, 66,000 CFAF/ha in transferred schemes 45,000 CFAF/ha in non-transferred schemes, and 47,000 CFAF/ha in private irrigation schemes (SAED, 1993; Riddell, 1997).

South Korea

Financial sustainability of WUAs in relation to meeting the O&M costs is not a serious problem in Korea, as the country is following a deliberate policy of subsidizing its farmers (Seuk-Hun-Joo, 1997). Irrigation fees cover about 40% of the total costs of the farmland improvement associations (FIA) that take charge of water management. At the farm level, five to ten irrigation groups (called Heungnonggye) under the FIA carry out O&M of irrigation systems. Farmers cultivating irrigated farms outside the FIA boundary with irrigable area less than 50 ha, organize WUA.

The collection efficiency is close to 98%.

[18] The disengagement process in Senegal has been a gradual process, with not all irrigation schemes being transferred at the same time.

[19] It can be seen that farmers in Senegal are not actually paying for water, 90% of Senegalese people are Muslim, and it is against Islamic principles to charge for water, as water is seen as a basic human need, necessary for all people.

Sri Lanka

In Sri Lanka, the Irrigation Ordinance of 1946 has made provision for cost recovery, setting irrigation fees according to the quantity of water supplied to a given tract of paddy land, or according to the cost of construction or maintenance of major irrigation works. Although there is a law for collecting irrigation service fees from water users, this is not enforced.

The Irrigation Management Division of the Ministry of Irrigation, Power and Energy introduced an irrigation service fee to be collected from farmers on the 40 major schemes in which it was working. The fee was used to defray the O&M costs of the schemes. In the first year the fees collected were about 50% of the targeted amount. By 1987, only 5% of the targeted amount was collected. The government then officially stopped charging irrigation fees.

Reasons for the failure of the program were:

- Funds collected were not used in the schemes from which they were collected as promised.
- Farmers were given no voice in how the funds would be used as promised.
- Action to collect from defaulters was not taken.
- Farmers saw no improvement in maintenance by the government.
- The Communist and JVP political parties did not support payment by farmers.

The law also provides for excusing farmers from paying the fee if they agree to take over their distributary for O&M. The Government of Sri Lanka is implementing a policy of distributary turnover to farmer organizations, but its failure to charge fees reduces the incentive for farmers to agree. In general, on "turned over" subsystems, the Irrigation Department pays a lump sum to the farmer organization for carrying out the maintenance works that covers only 30% of the total costs. But farmer organizations rarely collect irrigation fees themselves. They depend on government payments for maintenance and on various agricultural input and output marketing ventures for the bulk of their income.

Sudan

For the Gezira Scheme in Sudan, in 1981 there was a Land, Administration and Water Charge (LWC) (IIMI Sudan, 1996. P 49). The components of the LWC to Recover Water Charges included:

i. Capital costs of the irrigation system comprising depreciation, replacement cost reserve and interest on long-term loans.
ii. Operation costs which are the expenses of O & M.
iii. Overhead costs other than capital costs, which include a proportion of the Ministry of Irrigation headquarters' costs (Cost Recovery Committee 1980).

The administration charges have similar expenses to water charges. There is a land charge in place, as the government either owns or administers the land (and is thus the landlord, expecting rent from the tenants or farmers). Cost recovery was the main objective of the new LWC, but there were some concessions to the tenants' trade unions. Furthermore, when the LWC was implemented, a land charge was not incorporated (before 1990/91), nor were the proceeds of the water charges transferred to the Ministry of Irrigation or the Ministry of Finance.

Water Charges are area-based weighted by crop water requirements (CWR), with the rate being set according to a combination of average cost and ability-to-pay principles "because the farm-gate prices of

cotton and wheat are determined according to a cost-plus criterion including LWC costs. Certain deductions are allowed to compensate for the inefficiencies of the irrigation system" (IIMI Sudan, 1996. p.52).

The Gezira Scheme is readily adaptable to volumetric charges with little additional costs.

Turkey

O&M cost is fully recoverable and is based on a nationwide fee schedule that is updated annually by the government (General Directorate of State Hydraulic Works). The fee schedule has six sets of charges based on geographic location and type of service. The country is divided into three areas: coastal, inner, and eastern. The corresponding costs in each area are added to calculate rates within a geographic area. Fees for surface water service, groundwater service, and fees for areas where wet lands have been reclaimed are calculated differently (IIMI, 1997; Svendsen, 1997).

The policy requires that the fee equal 5% of value added to crop production by irrigation. However, in practice the fee is based on previous season's O&M costs and is charged for 85% of the gross irrigated area. Rates vary for the 29 different crops in each of the six sets according to water demand and profitability.

On government managed irrigation schemes, the first installment for O&M payment is due on March 1st, which is nine months after the harvest of the crop for which payment is being made. . The second payment is due two months later. A 10% fine is charged for late payment. The government assigns agents to collect the fees.

By May 1997, irrigation facilities providing surface water to 1.2 million ha and groundwater to 500,000 ha have been transferred. Though the turnover program started in 1950s, it gathered real momentum only since 1993. Water service entities (WSEs) are responsible for collecting fees from their members, in irrigation systems where O&M of distribution facilities have been turned over. The WSEs, forward a portion of the money collected, to the Government Ministry of Finance, as payment for O&M of the main facility. In the case of ground water schemes, cooperatives are responsible for O&M costs for the scheme.

In transferred systems, fees are based on a map prepared by WSE that shows all the irrigated parcels, the name of irrigator, the area irrigated and the crop grown. Farmers complete a demand form at the start of the season with information about their cropping pattern, area to be irrigated, and their location in the distribution system. During the season, farmers submit written requests indicating when they want water and the crop and area to be irrigated.

The rates for irrigation water service fee are fixed by the WSEs at the general assembly meeting in May or June. A fee rate schedule is prepared by the chairman and staff of the WSE , reviewed with the agency staff and presented at the meeting.

During the transition period of the turnover program, the WSEs are allowed to keep the entire fee collected. No payment is made to the government agency for the O&M expenses of the main facilities. Thus, during this period the WSEs collections may go up to double that of the O&M requirement of the facilities they manage.

Fees are collected in cash by the sub groups of the WSE's at the local level. . Amounts due from each farmer are posted in public places such as mosques and coffeehouses. Timing of fee collection varies from system to system. Collections are strictly enforced and the defaulter could be sued in court and

also imposed cash fines for late payment (about 15% per month). Many WSEs also generate reserve funds for emergencies.

Discussion

As a consequence of Nepal's irrigation policies in the last decade, O&M responsibilities of a large number of previously state-managed irrigation systems have been either fully or partially transferred to the respective beneficiaries' organizations. Examples of fully transferred systems include, Panchkanya Irrigation System (400 ha), Nepal West Gandak Canal Irrigation System (9,000[20] ha), Aandhi Khola Irrigation System (282 ha), Marchwar Lift irrigation System (2,815 ha) and Bhairahwa Lumbini Ground Water Project tube well systems (about 120 ha each). Examples of partially transferred systems include, Kankai (7,000[21] ha) and Khageri Irrigation Systems (3,900 ha).

Transfer of O&M responsibilities, either fully or partly, has depended mainly on two factors: *size* of the irrigation systems and *capability and willingness* of the farmers to take over such responsibilities. The policy in general does not restrict beneficiaries from assuming such responsibilities in state-managed irrigation systems of any size. The exception being systems developed as a part of an integrated or multipurpose project, which is considered crucial for national interests. Even in such systems, part transfer of O&M responsibility is allowed. With regard to capability and willingness of farmers to take over management responsibility, the policy clearly states that O&M responsibilities of all small irrigation systems less than 2,000 ha in *terai* and 500 ha in the hills, will be fully transferred to local organizations of beneficiary farmers. These systems are simpler to manage as already demonstrated by numerous farmer-managed irrigation systems. In larger systems, farmers are encouraged to assume a greater role in e O&M activities. If farmers prove to be capable and willing to assume full O&M responsibilities, the management of the entire scheme could be transferred, e.g. Nepal West Gandak and Marchwar Lift in *terai* and Aandhi Khola in hills.

The approach to transfer has been to start with joint management in both small and large schemes. Under joint management the organized farmers and the state agency jointly formulate management strategy and implement the required O&M tasks. This process provides a favorable environment for management transfer and a base from which full or part transfer of management can begin. The target is to transfer as much as possible of O&M responsibilities to farmers during the period of joint management. The reason for doing so, is the assumption that the farmers may not have the required capacity, technically or managerially, to assume the O&M responsibilities at once. I By starting with the joint management and taking responsibility for implementing joint decisions for a period of time, it is expected to gradually improve the the capacity of farmers for such responsibility prior to the stage of full or partial management transfer. Full management transfer can occur when it can be demonstrated that the farmers' management capacity has been upgraded to the level required by the technical and managerial attributes of that particular irrigation system.

In Nepal, the operational condition of the irrigation system is improved through a rehabilitation program, prior to management transfer. This provides an incentive to farmers to take over management responsibility, as the system requires less maintenance and results in lower costs for O&M at the time of take over. However, the cost of such system improvements should be shared by the the beneficiary farmers on a pre-determined proportionate basis.

In state-managed systems, the irrigation agency is expected to recover all investment costs, through the imposition of a water tax or cess on irrigation services provided to the beneficiary farmers. . Ideally, the rates should be fixed such that both development cost of irrigation and recurrent cost of O&M for irrigation

[20] Designed command area is 10,300 ha.

[21] Functional irrigable area is 7,000 ha whereas the total command area is 8,000 ha.

services, can be recovered from the farmers. However, the present rates[22] of water cess, (NRs. 60 per crop per hectare for a maximum of two crops in most run-of-the river schemes and NRs. 400 for tube well irrigation systems) involve a substantial subsidy to the farmers. Even if the state collects 100% of the cess, it would not be possible to meet the cost of O&M. On an average, the state has been allocating, a budget of NRs. 374/ha to run-of-the river irrigation systems over the last three years, to provide irrigation services to an estimated 172,775 ha. of irrigated land. If we assume a 200% irrigation intensity, the water cess would provide a maximum of only NRs. 20,733,000 at a flat rate of NRs. 120 per ha for two crops. This works out to 32 % of the total allocated budget or just a third of the actual expenditure on O&M. is collected from farmers.

After full management transfer, all O&M costs are to be fully borne by the farmers themselves. They can decide on the rates to be collected as irrigation fees to finance recurrent O&M costs of the irrigation system. The prevailing irrigation policy does not elaborate on cost recovery for capital investments incurred in developing the irrigation infrastructure. Such investments have usually been made from state funds or grants or loans provided by international donors.

In the case of partially transferred irrigation systems, cost of O&M is shared by the state and farmer organizations, the proportions varying according to the extent of management transfer, as outlined in the irrigation policy. It was envisaged that this arrangement would provide incentives to the farmers themselves to collect irrigation service fees. The proportion of the fees collected , which can be retained by farmers, depends on the extent of management transfer. In other words, the greater the responsibility farmers have assumed in system management activities, the greater is the proportion they can retain. If they have taken over the entire O&M responsibility of the irrigation system, they can retain the entire amount collected. During the stage of joint management, whatever the extent of management transfer, the rates have to be decided jointly by the state's irrigation agency and the farmer organizations.

In essence, the changes in financial arrangements indicate that in entirely state managed systems, , the state would provide funds for O&M of the irrigation system and therefore the state will set the charges, and retain the collection for the state coffers. When both, i.e. state and the farmers' organization, jointly manage the system, both entities would make investments in O&M activities, and therefore will share the collected fees. With full farmer management, the O&M costs would be provided by the farmer organizations, which can retain the entire collection of fees.

The shift in the financing mode and entailing changes in arrangements related to irrigation service fees are portrayed in Table7.1 below:

Table 7.1 Management Transfer and Changes in Operation and Financing Mode

Irrigation System		
State-Managed	**Jointly – Managed**	**Management – Transferred**
State manages the entire system	Management responsibility is shared	Management responsibilities transferred over to farmers
State finances the O&M costs	O&M costs are jointly financed	Farmers finance the O&M costs
State collects ISF	WUA collects ISF	Farmers collect ISF
State fixes the rates	Rates are jointly fixed	Farmers fix the rates
State keeps all the collections	Collections are shared	Collections are retained by farmers

[22] In some irrigation systems, the Irrigation Service Fees are set differently using the authority of Board administration. For instance, the Kankai Irrigation System has been charging NRs. 100/ha/per rice crop whereas, Sunsari Morang has set the ISF Rate as NRs. 400/ha to be enforced from the coming fiscal year.

As seen above, problems encountered in ISF collection in most developing countries seem to be similar. One major problem faced by most countries is that, physically, it is very difficult to implement a "no pay – no water" policy because of the prevailing design of irrigation systems. The other pertinent problem is regarding the accuracy of the data of delivered services. Researches have revealed that there are significant discrepancies between irrigated, planted and billed areas. Thirdly, the method of fee collection is costly, lengthy and provides little incentive to the collectors. In many countries e.g. Bangladesh, Pakistan, and Nepal etc., the collection goes to the general government treasury and is not related to the O&M budget. Therefore, the agency has no material incentive to increase collection efficiency. Another problem in achieving financial self-sufficiency is that it depends not only on the level of tariffs but also on the amount of water that the source has.

Water charge is a sensitive issue, since increases or changes can affect the livelihood of farmers. . As illustrated in an IIMI Report "Assessing the Impact of Irrigation Management Transfer (IMT)" Vermillion, 1996, several countries experienced a change in water charge following IMT. In Indonesia, IMT led to a reduction in government subsidies,[23] and a five to seven fold increase in water charges to farmers. (Johnson & Reiss, 1993). Studies in the Dominican Republic (Yap-Salinas, 1994), Mexico (Gorriz et. al., 1995) and China (Johnson and Vermillion, 1995) showed that IMT resulted in an increase in water charges. On the other hand, IMT in India has led to more efficient pump use, resulting in a decrease in the cost of water to farmers (Pant, 1995). Other countries which experienced a decrease in the cost of water to farmers after IMT include, the Philippines (Oorthuizen and Kloezen, 1995) and Egypt (Azziz, 1994).

[23] This was in order to reduce government expenditure in irrigation, a major motivation for IMT.

Chapter VIII

Conclusions and Recommendations

This chapter summarizes the conclusions and recommendations arrived at on the basis of the discussions and analysis described in detail in the previous chapters.

1. Prevailing ISF rates in government managed irrigation schemes in Nepal are far below the rates required to meet O&M costs. Currently, ISF collection by DOI even at a modest rate is extremely low (less than 2% of O&M costs). In fact , the cost of ISF collection was found to be higher than actual collection. . Thus, capital cost recovery from the farmers may not be possible at this juncture. *The major concern of the government and local organizations now must be to generate the recurring O&M costs of irrigation systems.* However, the final goal should be to recover the capital cost. This process should begin, as soon as the irrigation systems attain financial autonomy in meeting O&M costs.

2. *Increase in water charges, though a sensitive issue, is possible and viable if there is enough commitment at all levels of management.* As illustrated in a report entitled "Report on Assessing the Impact of Irrigation Management Transfer (IMT)" (Vermillion, 1996), several countries experienced a change in water charges following IMT. In Indonesia, IMT led to a reduction in government subsidies,[24] resulting in a five to seven fold increase in water charges to farmers. (Johnson & Reiss, 1993). Studies in the Dominican Republic (Yap-Salinas, 1994), Mexico (Gorriz et. al., 1995) and China (Johnson and Vermillion, 1995) showed that IMT resulted in an increase in water charge . On the other hand, IMT in India has led to more efficient pump use, resulting in a decrease in the cost of water to farmers. (Pant, 1995). Other countries which experienced a decrease in the cost of water after IMT include; the Philippines (Oorthuizen and Kloezen, 1995) and Egypt (Azziz, 1994).

3. *It is not necessarily true that the collection efficiency will decrease with the increase in the ISF rates.* International experiences have revealed that, in the long run, an increase in the ISF rate, does not affect collection efficiency. In the Philippines an increase in irrigation fee rate caused the collection efficiency to drop to 27% in 1975/76 from 40% in the period 1971/72-1974/75. , However by 1984, collection efficiency had gradually increased to 49%. The total ISF collection increased from P 6.4 M- P15.6 M in the period 1971/72 –1974/75 to P38 M in 1977 and to over P 98.9 M in 1984. In Mexico, subsidy on O&M was 72% in 1988 and it increased to over 400% subsequently. At present, however, financial self-sufficiency has been achieved in most of the transferred districts.

4. In general, it was observed that resource mobilization efforts were more successful where water deliveries were reliable and equitable and provided in adequate quantities. , However, the impact the above factors were not the same. Equity in water distribution was found to be the most sensitive, followed by water reliability and water adequacy. Thus, *one of the pre-conditions for increasing the ISF rate and thereby increasing the collection is to improve the quality of services in terms of assured and equitable delivery of water to the farmers in the entire service area.*

[24] This was in order to reduce government expenditure in irrigation, a major motivation for IMT.

5. WUAs have a good understanding of the background of the individual farmer , and have built up personal relationships useful in making the collection process more successful. *ISF collection can be improved by decentralizing the responsibility for levying, and collecting fees and for spending the fee collected.* This has been proved by higher collections of ISF in some irrigation systems (viz. Mahakali, West Gandak, Khageri, Panchkanya and Kankai) under WUAs' initiative.

6. It is often argued that willingness of farmers to pay ISF is closely related to their ability to pay, which is usually reflected in terms of incremental net benefit from irrigation. However, WUAs with better organizational capacities have been more successful in collection efforts irrespective of incremental net benefit from irrigation. So, *it is vital that the organizational capacity of WUAs be strengthened to improve water charge collection. WUA should be organized in schemes if they do not exist at present. If WUAs are already established, they should be empowered with supporting rules, regulations and authority.*

7. As the WUA has been recognized as the major institution responsible for the collection and utilization of ISF, *legal provision should be made for empowering the WUAs for the collection and utilization of ISF forO&M .*

8. Many shortcomings have been observed in the course of implementing ISF collection under the prevailing legal framework. Details regarding mechanism of collection are not stipulated in the existing rules and regulation. The existing policy has many details that should have been incorporated under the Irrigation Regulations. There is no clearly defined principle for water pricing. Existing legal provisions reflect all of the following principles:

   - "Water as a commodity".
   - "Return to investment in water".
   - "O&M cost recovery".
   - "Taxation on benefit from water".
   - " No charge on water".

   So, it is necessary that *ambiguities and controversies in policy and the law be removed. Any conflict with the concept of self-financing of irrigation service (treating ISF as the means for fully recovering the O&M cost) should be removed.*

9. *For long-term sustainability of self-financed irrigation service, ISF rates and collection should be directly related to O&M expenditure. Both income and expenditure from other sources should be kept to a minimum. ISF should not be substituted by alternative sources of income and thereby let the irrigation service deteriorate. .*

10. *The rate for ISF should be determined separately for each system by a committee composed of government and WUA representatives. The rate should depend on the system's attributes.* It would not be effective to establish an uniform ISF. The objective should be to mobilize resources internally at least to meet the O&M cost of each system. Initially, at the joint management stage, the government should be involved in such activities. However, eventually, the government should pull out after full management transfer.

11. An assessment of O&M requirements and delivered irrigation services must be made in order to recover O&M costs from the recipients of irrigation services. In a majority of the cases, this is not done because insufficient attention is paid to planning of O&M activities. Therefore it is necessary

that both the *WUA and irrigation agency incorporate these activities s as part of their basic duties and responsibilities.*

12. The following methodology can be used for assessing the delivered irrigation service in jointly-managed systems. The net command area for rainy season should be delineated on a map based on ground studies and a flat fee fixed per hectare of land within the command area. For other crops, ISF should be based on actual irrigated area under a particular crop. The WUA should provide the details of irrigated areas under different crops to the irrigation agency. For deep tube wells, charges should be fixed on volumetric or hourly bases. In general, two thirds of the O&M costs should come from the charges in the rainy season from the paddy crop and the remaining from the other crops. However, for individual schemes, this proportion may have to be adjusted according to the crops grown. . *Rates could thus vary for different crops.*

13. *In systems under joint management, O&M requirements should be assessed separately for different systems depending upon their specific characteristics and scope of O&M works. The agency officials and the relevant WUA/WUG should jointly make an assessment after closure of canals, at least twice a year.* The scope of work under O&M should include all work from head to tail end, including the command area been created under the project (headwork, canals, canal structures, and other facilities). Operational costs should include salary and wages of all staffs, office expenses, overhead charges, operation of gates and outlets, painting and greasing of gates, cost incurred in the collection of water service fees, etc. Similarly, maintenance should include regular maintenance work that can be planned in advance and emergency repairs excluding catastrophic or calamity damages. Deferred or accumulated maintenance should not be considered for ISF determination as it is already accounted for. The assessment of repair and maintenance work for the whole scheme should be completed within one week of the closure of canals in small schemes and within one month in larger systems.

14. *No irrigation system should be allowed to write off arrears unless it is verified that individual farmers had been charged for irrigation services that they did not receive.*

15. In farmer managed systems, there is greater flexibility with regard to the modes of payment of ISF Such payments can be made in terms of cash, kind or labor. These three are easily convertible and the conversion factor is determined by the WUA. However, in jointly managed irrigation systems, non-cash collections may create difficulties and therefore *full flexibility in payment mode should not be allowed. In systems where labor contribution is vital, ISF can be paid in terms of labor in lieu of cash.* However, this will require careful and transparent accounting procedures.

16. In JMISs, the collection of ISF prior to the delivery of water supplies in the main season was found to be the most effective. In Nepal's context, collection can be done once or twice a year. *It should be collected in Poush (Mid December) for rainy season crops and in Jestha (Mid May) for winter crops.* Penalties should be imposed for payments made after the deadline.

17. *An incentive system should be established for both the farmers and the collectors, in order to make the collection process more effective.* Incentive for the farmers can be delivery of water on a `first pay first serve basis' as in Bangeri Irrigation System, or a system of discount for paying ahead of time and penalty for late payers. Free riders can be controlled effectively by barring non-payers from receiving water. In instances where barring water individually is not practical because of insufficient or ineffective water control, the whole hydrological block can be denied water. Similarly, an incentive structure for collectors can be the payment of a certain percentage of the collected amount.

18. The *help of the local VDC's should be obtained in improving collections. Records of irrigated and un-irrigated land area should be made available to VDC offices.* VDCs and the WUA could come to an agreement on collection efforts and a share of the collections can be given to the VDC if needed.

19. In case of JMISs, the *WUA should deposit the share of the ISF, as stipulated in the Policy, in the bank account of the project office, at the field level, by the end of Ashadh (Mid July).*

20. In many FMIS farmers keep the collections in jointly operated bank accounts and submit the expense accounts at the general assembly meetings. Transparency in ISF collections and expenditures is crucial for developing mutual trust among beneficiaries and improving collection efficiency. The *practice of maintaining transparency should be promoted and legal provision made for sanctions for non-compliance. Sanctions could include, cancellation of registration, withdrawal of support programs, etc.* WUAs must keep up-to-date records, do regular auditing, and post public notices of persons who have paid or not paid ISF.

21. Under the laws of Nepal ISF is categorized as a water tax. Consequently, ISF is perceived by farmers as money going into general government revenue with little benefit accruing to them. As a result, it has proved difficult to collect. It would be much easier to collect ISF, if it is identified as a local tax to be used for the benefit of the local people. Therefore, *the ISF collections should be kept at the project level to be utilized for system O&M, and not be deposited in the Consolidated Fund of HMG.*

22. The Irrigation Regulation, 2045 was formulated under the Irrigation, Electricity and Related Water Resources Act, 2024. It would be best, if *a new Irrigation Regulation based on Water Resources Act 2049 is promulgated soon.*

23. ISF is closely related to management transfer. Attainment of financial self-sufficiency should precede management transfer as it could provide an incentive to r farmers for taking over the management. Therefore *efforts to promote resource mobilization to cover the entire cost of regular O&M at the system level, should not be delayed.*

24. Attainment of financial self-sufficiency should be a gradual process. While promoting financial autonomy it is necessary to ensure long-term political support. The process requires careful planning and a provision for a transition period during which some funds for irrigation O&M continue to flow to the irrigation agency from the government.

25. A shift in paradigm is advocated, by changing the role of the DOI to that of a facilitator, and not an administrator of O&M of the irrigation systems. This is required in order to improve the collection of ISF for financing O&M. The DOI should provide the needed training to the WUA officials, provide maps of parcels to the WUA, and help in obtaining various kinds of support from agriculture related agencies.

Bibliography

ADB/IIMI. 1986. Irrigation Service Fees, Proceedings of the Regional Seminar on Irrigation Service Fees, Manila: ADB.

Asad Uz Zaman, M. (1996), " Sustainable Irrigation Management through Cost Recovery System ", in Howsam, P. & Carter, R. C. (eds.), Water Policy: Allocation and Management in Practice, Proceedings of International Conference on Water Policy, held at Cranfield University, U.K., 23-24 September 1996, E & FN Spon, pp. 221-227

Barker, R. and Joyti Lohani. 1987. O&M and Mobilization in Government Managed Irrigation Schemes in Nepal, Consultancy Report submitted to IMP, Kathmandu.

Chambouleyron, Jorge and et. al. 1997. Second Generation Benefits and Problems of Participatory Irrigation Management: Argentina Case Study. Paper presented to the International Workshop on Participatory Irrigation Management: Second Generation Problems. World Bank EDI / IIMI, Cali, Colombia.

Clyma, Wayne et. al. 1998. A Farm Water Management Model for Nepal. Irrigation Management Transfer Project. Department of Irrigation, Nepal.

CMS. 1996. Rapid appraisal of Mahakali Irrigation Project, Kathmandu: CMS

Coward, E. Walter and Norman Uphoff. 1986. Operation and Maintenance in Asian Irrigation: Re-appraising government and farmer responsibilities and rights in Irrigation and Drainage Systems, Netherlands.

Department of Agriculture, 1996. Cost of Production of Cereal Crops (Paddy, Maize and Wheat), Kathmandu: DOA, Economic Analysis and Statistics Division

Department of Statistics. 1998. Statistical Pocket Book, Nepal. Kathmandu: National Planning Commission, Central Bureau of Statistics.

DOI, 1997. Database for Irrigation Development in Nepal, Department of Irrigation, Nepal

DOI. Rules and Regulations governing WUAs, DOI.

Erskine, John. 1997. "Sustainability measures for Natural Resources" in Ganesh Shivakoti, et. al (eds.). People and participation in Sustainable Development, Bloomington, Indiana.

Freeman D. M., 1992. "Creating a supportive policy environment for irrigation system turnover and joint management", Research and Training Branch, Department of Irrigation, Nepal.

Gill, Gerald. J. 1996. Maintaining the Granary, Kathmandu: Winrock International

Gurung, M. B. 1997. "Management of Turnover Systems in Bhairahwa Lumbini Groundwater Project: Role of farmers and agency in system management" in I. Neupane and K. C. Prasad (eds.). Evaluation of Irrigation Management transfer: Process and Performance, Kathmandu: RTDB and IIMI

Hakim, M. A., and Parker, D. E. 1991. Irrigation Service Fee Collection Efficiency. Bangladesh Agricultural Research Council (BARC). Farmgate, Dhaka.

Hilton, Rita. 1989. Cost Recovery and Local Resource Mobilization in Irrigation Systems in Nepal: Case Studies from Rapti Zone, Kathmandu: Rapti Zone Integrated Rural Development.

Hilton, Rita. 1990. Cost Recovery and Local Resource Mobilization in Irrigation Systems in Nepal: Case Study of Karjahi Irrigation System, NY: Maxwell School of Citizenship and Public Affairs, Syracuse University.

IIMI, 1997. Country Review of Turnover Programs, Turkey. IIMI, Sri Lanka

IIMI, 1998a. Performance Measures Study, 1998. IIMI, Nepal

IIMI, 1998b. IMT Impact Assessment Study, 1998. IIMI, Nepal

IIMI. Sudan (1996), Irrigation Management in Sudan: Irrigation water charges in Sudan: Proceedings of Workshop held at Wad Medani, 28 May 1991. Unpublished report (Technical Report No. 5).

Jodha, N. S. 1998. " Poverty- Environmental Resources Degradation Links: Questioning the basic premises" in Issues in Mountain Development 98/1 Kathmandu: ICIMOD

Johnson III, Sam H. 1998. "Irrigation Management Transfer in Mexico: A strategy to Achieve Irrigation District sustainability" in Abstract, Research Report 16, IIMI.

Khanal, P. R. 1997. "Analysis of Process and Impacts of Management transfer in Khageri and Panchkanya systems" in I. Neupane and K. C. Prasad (eds.). Evaluation of Irrigation Management transfer: Process and Performance, Kathmandu: RTDB and IIMI.

Lohani. Jyoti. 1986. Nepal Irrigation Water Charge Study, Report Prepared for ADB, Kathmandu.

Martin, Ed and Robert Yoder. 1988. " A comparative description of two farmer-managed irrigation systems in Nepal" in Irrigation and Drainage Systems 2: Netherlands.

Maskey R. K. and Karl E. Weber, 1998. "Sustaining Irrigation Systems in Less Developed Countries: Evidences from a field Study in the Hills of Nepal". In Water Resource Development, Vol. 14, No. 1, pp. 67-76, 1998.

Ministry of Law. 1993. Water Resources Act of Nepal. Kathmandu:

Mishra, V. S. and D. J. Molden. 1996. Management Turnover in West Gandak Irrigation System, Nepal, Colombo: IIMI, Report No. 14.

MOWR. 1997. Irrigation Policy of Nepal (with amendments) Kathmandu: Department of Irrigation.

National Planning Commission. 1994. Irrigation Development in Retrospect: Search for a breakthrough, Kathmandu: NPC.

Nepal Society of Agricultural Engineers (NSAE), 1997, Impact Evaluation Study of Andhi Khola Irrigation system. United Mission to Nepal.

Neupane, R. R. S., December 1997. Irrigation Pricing Policies and Structures. An unpublished discussion paper. Irrigation Management Transfer Project, Department of Irrigation, Nepal

NIA. Dec. 1985. Strategies for the Improvement of Irrigation Service Fee Collection. Philippines.

Palacios, Enrique V. Feb 1997. Benefits and Second Generation Problems: The case of Mexico. Paper presented to the International Workshop on Participatory Irrigation Management: Second Generation Problems. World Bank EDI / IIMI, Cali, Colombia.

Poppe, Joy, 1993. Socioeconomic survey, Andhi Khola Project, United Mission to Nepal.

Pradhan, N. 1994. Technical Efficiency, institutional analysis and transaction cost of Public Irrigation Systems under farmer and government management in the Terai of Nepal, Manila: University of the Philippines at Los Banos

Pradhan, P. et. al. 1987." Resource Mobilization and Organization Pattern in Kulariya, Jamara and Rani Kulos in Kailali District", in Irrigation Management in Nepal, Colombo: IIMI.

Pradhan, P., 1989. Patterns of Irrigation Organization in Nepal: A comparative Study of 21 Farmer-Managed Irrigation Systems. IIMI.

Pradhan, T. M. S., 1996. Gated or Ungated Water control in Government-built Irrigation Systems: Comparative Research in Nepal. Grafisch Service Centrum, Wagningen.

Pradhan, Ujjawal. 1988. Local Resource Mobilization and Government Intervention in Hill Irrigation Systems in Nepal, NY: Department of Rural Sociology, Cornell University.

Prasad, K. C., 1994. Local Irrigation Organization in Nepal. Professional paper for Master's degree submitted to Colorado State University, USA

Quintero-Pinto, Luis E. Jan, 1997. Participatory Management of Irrigation: Benefits and Second Generation Problems, The Case of Colombia. Paper presented to the International Workshop on Participatory Irrigation Management: Second Generation Problems. World Bank EDI / IIMI, Cali, Colombia.

Riddell, N. S. (1997), Productivity and Government Withdrawal in Irrigated Rice Production in the Delta Region of Senegal, Ph.D. Thesis, University of Strathclyde, U.K.

SAED (1993), Note sur l'Entretien et la Gestion de la Cuvette de Pont Gendarme, Délégation de Dagana, Republic of Senegal, January.

Satyal, Ram P. 1996. "Participatory approach in Nepal " in INPIM Newsletter, No. 4.

Seuk-Hun-Joo, 1997. A draft concept paper.

Sharma, D. S. and N. Ansari. 1997. " Development of Participatory Managed Irrigation Systems: Lessons learnt from ISP" in I. Neupane and K. C. Prasad (Eds.) Evaluation of Irrigation Management Transfer Process and Performance, Workshop Proceedings, Kathmandu: RTDB and IIMI.

Sharma, K. R. 1998. Status of Participatory Irrigation Management in Nepal. Paper presented in the national PIM seminar, Chitwan, Nepal.

Sharma, Raghu, 1995. A strategy for AKWUA: Toward sustainability of irrigation program, Syangja, Nepal. Thesis submitted to Asian Institute of Management, Philippines.

Shrestha, Tek Bahadur, et. al. 1984. Study of Operation and Maintenance Problems in Nepalese Irrigation Projects, Kathmandu: No-Fraills Development Consultants.

Shukla, A. and Khem Raj Sharma. 1997. Participatory Irrigation Management in Nepal, A Monograph on Evolution, Processes and Performance, Kathmandu: RTDB, Department of Irrigation.

Small, L. E. & Adriano, M. S. (1989), " Financing Irrigation Services in Indonesia ", in Small, L. E. et al. (1989), Financing Irrigation Services: A Literature Review and Selected Case Studies from Asia, IIMI.

Sohani, Amin. Sept 1997. Financial Feasibility Analysis of Operation and Maintenance Costs for Water Users Federations on three Pilot Distributaries in Province of Sindh, Pakistan. Interim Report. IIMI, Pakistan National Program.

Svendsen, Mark and Nott, Gladys. Feb 1997. Irrigation Management Transfer in Turkey: Process and Outcomes. Paper presented to the International Workshop on Participatory Irrigation Management: Second Generation Problems. World Bank EDI/IIMI, Cali, Colombia.

United Mission to Nepal (UMN), 1997. Project completion Report, Andhi Khola Irrigation Project, Syangja, Nepal.

Vermillion, D. (ed.) (1996), The Privatization and Self-Management of Irrigation, Final Report, April, IIMI.

Wall, Gavin. 1997. " Role of Water Users Associations for environmentally Sustainable Irrigation Management" in Prachanda Pradhan (ed.). Irrigation Associations for Participatory Management, Tokyo: Asian Productivity Organization (forthcoming publication)

WB. 1986. World Bank Lending Conditionality: A Review of Cost Recovery in Irrigation, Washington DC.

Yoder, Robert, Prachanda Pradhan and et. al. 1987. Rapid Appraisal Report of the Boktan Tedhi/Gurgi Farmer Managed Irrigation System of Kailali District, Kathmandu: IIMI-Nepal.

Yoder, Robert. 1994. Locally managed Irrigation Systems, Colombo: IIMI.

Yoder, Robert. 1994. Organization and Management by Farmers in the Chhattis Mauja Irrigation System, Nepal. IIMI.

Annex 1: Aandhi Khola Irrigation System

The Aandhi Khola Irrigation System (AKIS) is located near Galyang Bhanjyang in Syangja district of Nepal. It is accessible by the all season Pokhara-Butwal highway and lies at about 85-Km southwest of Pokhara.

Background

This hill irrigation system was constructed during 1987-1996 withfinancial support from the Norwegian Agency for Development Cooperation (NORAD) and the United Mission to Nepal (UMN). The irrigation system was constructed as a part of an integrated rural development program. The management responsibilities of the irrigation system were transferred, on June 27 1997, to a local beneficiary organization called Aandhi Khola Multipurpose Water Users Association (AKWUA).

1. Main Features

1.1 Physical features

Headwork

The headwork (HW) on the Aandhi Khola is of a permanent type and consists of an Ogee type concrete weir equipped with a gated under-sluice on the left, a desilting basin, and other subsidiary concrete structures. From the gated under-sluice, water is taken through a tunnel to a surge tank of a hydroelectricity plant. The main canals start at this point. The HW location is geologically stable and well protected with no retrogression downstream. Operation and maintenance (O&M) cost is minimal due to the excellent condition of the HW. Only minor maintenance work such as greasing, painting, etc. are required for the HW. The beneficiary organization has to bear only 20% (UMN, 1997) of the total maintenance cost of the HW structures.

Canals

Two main canals, both of the contour type, emerge downstream of the surge tank – one going east and the other west, measuring 5.1 and 1.5 Km respectively. . The canals pass through numerous drainage crossings and a few landslide prone areas. . However, these canals are lined suitably with soil, cement, or concrete at various locations and are well equipped with buried or suspended Galvanized Iron, Reinforced Cement Concrete, and High Density Polythene pipes, and other reliable canal structures. They are functioning satisfactorily and have no major problem of seepage, landslide, retrogression, or silt.

The eastern main canal has off-takes for eight branch canals and the western main canal has off-takes for two branch canals. All branch canals are of ridge type totaling in length 24 km inclusive of the Asardi pipe canal. These canals too are well protected and equipped with dependable structures and therefore have no major problem of seepage, landslide, retrogression, or silt. Distribution structures have been constructed in these canals to allow proportionate water distribution among tertiary canals or to allow rotational water supply during the times of water shortage.

The canal system is in good condition and requires little maintenance.

Command Area

The system provides irrigation facilities to 282 ha of agricultural land in Jagatra Devi and Tulsi Bhanjyang villages in Syangja district and Hungi village in Palpa district. The command area has a typical hilly type landscape of slopes up to 30^0. However, more than 70% of the land is flatter than 8^0 and is terraced. Soils in the command area are suitable for diversified agricultural practices and have no major drainage or erosion problem.

Major Structures

Major structures along the canal network include lined sections, gated regulators at off-takes, flumes, drop structures, buried pipe stretches, inverted siphons, desilting basins, cross drainage structures, pipe crossing over the suspended bridge, etc. Beyond the branch canals, water is released through proportionate water distribution boxes to respective tertiary canals. All water controlling and regulating structures are reliable, functioning efficiently, and in good physical condition enabling very good water control in the canal network.

These structures are very well constructed and are relatively expensive requiring little maintenance.

Water Adequacy

Aandhi Khola has sufficient water to meet the irrigation requirements for the summer and winter seasons for the entire command area. However, water becomes scarce during the spring. As the water distribution system is based on the principles of a share system, the available water is proportionately delivered to the entire canal network. Thus, water is adequate for the head, middle, and tail reaches for the summer and winter seasons. In spring, rotational water distribution is adopted due to inadequate supplies. Available water is shared equally by all users on the basis of the share system, irrespective of an individual's size of land holding.

Water Reliability and Equity

The system has a reliable water supply, since the source of water is a perennial river,(Aandhi Khola) and the HW and canal network of the AKIS are equipped with the necessary water control and regulating structures in sound physical condition. Similarly, water delivery in the entire command area, irrespective of the location , is based on the share system and no special preference is given to individuals owning larger shares against smaller shareholders. The AKWUA has been able to maintain equity in water distribution as well.

Constraints

The AKIS is integrated with the hydroelectricity plant, which has first right to available water from the source. The tailrace of the hydroelectricity plant is below the canal network and hence, the outgoing water cannot be re-used by the AKIS. This creates a shortage of irrigation water during the lean period. In addition, many structures in the AKIS are located in landslide prone areas and are relatively expensive requiring considerable amount of resources to rebuild in case of failure.

1.2 Socioeconomic Features

Ethnicity

The Brahmins, who constitute more than 75% of 1200 households dominate the command area inhabited by about 8,000 population. The rest are Kami, Damai, Sarki, etc (NSAE, 1997).

Migration

Overall, there is sufficient labor available for agricultural purposes in the area. The minor occupational castes constitute the bulk of the agricultural labor force in the command area. Some seasonal migration has been reported but was not found to have any significant impact on labor availability. The current trend for migration mostly to India is on the decline.

Income sources

More than 83% people in the command area are dependent on agriculture and consequently, the primary occupation as well as income source is agriculture (Sharma, 1997). About 15% of the workforce is engaged in other occupations within the project area, in other cities in Nepal or abroad.

Water Users Association

The AKWUA, formed in 1985, is the legally recognized organization representing the water users. It has a three-tiered structure comprising of the Board of Directors, a management body, and branch committees. The general meeting of the share-holders, can also appoint sub-committees for land distribution, inspection, or elections as deemed necessary.

The organization has collected complete records of the land shares owned by different individuals in the irrigation system and their associated obligations. The organizational checks and balances work well because of active council of representatives and general assembly of shareholders in the irrigation system. Such mechanisms allow for mutual information sharing and control through the means of a well-articulated constitution and bylaws.

1.3 Agriculture

Land tenure

The majority of the households in the command area own between 0.25 - 0.5 ha of land. The present land holding pattern shows that 6% of the households are land-less, while only 1% are big landowners (> 2 ha). (Sharma, 1997; NSAE, 1997). The average size of landholding is 0.24 ha per household.

Tenancy

About 17% of farmers have given out their land on rent or for sharecropping (Poppe, 1993. Pp.50-51). The four common methods of tenancy are listed below:

a. Rental for annual cash payment

b. Sharecropping – Owner and sharecropper each get half the annual production (Adhiya)
c. Sharecropping – Sharecropper gets winter season crops only
d. Bandhak – Land is mortgaged. Moneylender gets total grain production (in lieu of interests) until such time as the debt is repaid.

Cropping pattern

Major crops grown in the area are paddy, wheat, maize, and potato. With the development of irrigation system more and more lands are being brought under cultivation. Similarly, "baari" and meadow " are also being converted into rice fields. The cropping intensity is 289%. The extent cultivated and yields of different crops in 1996/97 are given in Table A 1.1 below:

Table A 1.1 Cultivated Extent and Yields in Aandhi Khola Irrigation System in 1996/97

Crop	Summer paddy	Spring paddy	Wheat	Maize	Potato	Oilseeds	Pulses	Millets	Sugarcane
Area in ha	268	4	248	263	11	8	1.5	287	1.3
Yield in t/ha	2.66	4.2	1.16	1.32	5.08	0.78	0.6	0.99	40

Source:

Recently, some cash crops such as sugarcane and vegetables have also been introduced indicating a changing trend toward cash crops.

Agriculture support services

In the beginning, Aandhi Khola Irrigation Project provided the agricultural support services in this area. However, with the completion of the project, the support services have been discontinued or phased out. There is one Agriculture Service Center situated in Galyang but this was reported to be not adequately servicing the needs of the farmers. .

Other support services such as training, credit, agricultural inputs such as improved seeds, fertilizer, etc were also found to be inadequate.

Market

Farmers in the project area complain about inappropriate marketing facilities for their agricultural produce. Recently, there was excess production of cabbage, causing marketing problems and losses to farmers. Marketing of sugarcane is also posing problems, as it has to be sold to a sugar mill down in Butwal. Other crops are consumed in and around the project area through local vendors.

2. ISF Related Terminology

Water Share - As required by the project, the labor contribution during the construction phase was provided on the basis of the share system in which farmers had to contribute five days of work to r earn one share in the irrigation system. Owning one share is equivalent to having the water use right of 642 litres per second (lps)/25,000 parts = 0.02568 lps/share. It was estimated that on average 36 shares in the system would be sufficient for a household to irrigate 0.4 ha. (UMN, 1997).

Irrigation Service Fee (ISF) – It is the fee to be paid to AKWUA for the provision of irrigation services. It is charged on the basis of share per season paid twice a year. ISF for two seasons, amounts to NRs. 900/ha.

3. Resource Mobilization for Financing O&M

3.1 Assessment of Resource Mobilization Requirements

Since the system also produces hydroelectricity, the Butwal Power Company is expected to provide 80% of the maintenance cost of the headwork. The AKWUA only has to provide the remaining 20%. In addition, it has to provide funds to cover the entire O&M cost of the canal network beyond the surge tank, by collecting ISF based on the share system.

The AKWUA needs NRs. 300,000 per year to meet the operation and maintenance expenses of the irrigation system. This figure has been estimated by AKWUA based on the past experience. (UMN, 1997).

3.2 Assessment of Delivered Irrigation Service

The resources for O&M of the system are obtained on the basis of the share system, i.e. on the amount of shares owned by individuals in the irrigation system. The AKWUA collects NRs. 3/share/per season (twice a year) for O&M of the canal network and NRs. 2/share/year for the maintenance cost of the head work structures as agreed with Butwal Power Company (20% of the total cost).

There is no defined or special mechanism for assessing the delivered irrigation service. Usually, water demands are submitted to AKWUA on the basis of the shares possessed by the individuals of a particular area.. Water is delivered to the respective reach, separately or in combination with similar demands from other sectors. The required discharge of water per share is already fixed at 0.025 lps. Once the water is delivered, a record is made of the persons who have received the irrigation service. ISF is charged from those receiving the service for a maximum of two seasons.

3.3 Relation between Resource Mobilization and Irrigation Service

The ISF in this system, is aimed at mobilizing resources to meet the O&M requirements of the irrigation system. However, at present, additional funds are being raised for repayment of the UMN loan , which has to be fully repaid in three years. In order to repay the UMN loan, farmers have to pay NRs.12/crop/share/per year. Once the loan is repaid, the AKWUA expects to raise money through ISF collection, only to cover the O&M cost. The ISF is charged only from those actually receiving irrigation service.

3.4 Forms of Resource Mobilization

The only form of resource mobilization in this irrigation system is cash, i.e. in form of ISF, which is calculated on the basis of share system (discharge per share) and the number of seasons for which irrigation service has been provided.

3.5 Relation between ISF and Water Adequacy and Reliability

Other than farmers' expression of satisfaction, there is no defined mechanism for assessing the delivered irrigation service in terms of adequacy and reliability. In other words, ISF rate has no relationship with the quality of irrigation service. Since the water availability is good for at least two seasons, and ISF is

charged for a maximum of two seasons, water adequacy and reliability have not been big problem in the irrigated area.

3.6 Farmers' Willingness to Pay

The gross incremental economic benefit from irrigation in the project area has been estimated at NRs. 15,800 per ha (Sharma, 1995 Pp. 54-55). The irrigation cost is estimated at NRs. 900 per ha, i.e. 5.7% of the gross incremental benefit. Similarly, the average gross economic return per ha in the irrigated area has been reported to be NRs. 45,760. Irrigation costs in the form of ISF, works out to 1.97% of the gross agricultural income.

Proportionately, the price paid for irrigation service is not very high in terms of the incremental benefit from irrigation. t. However, the absolute value of the payment .of NRs. 900/ha is one of the highest in whole of Nepal. Farmers were willing to pay this amount, provided that they received sufficient water to ensure adequate returns from agricultural activities.

3.7 ISF Collection Mechanism

The predefined ISF charges are collected directly by the AKWUA with the help of its office staff and deposited in the bank account.

3.8 Means for Controlling Free Riders

The issue of a predetermined quantity of discharge per share, according to payments made by shareholders was found to be a good basis for controlling free riders. The amount of discharge released to the canal network is based on the authentic demand of shareholders' that have already paid ISF. Demands of others who had not paid ISF are not incorporated in calculating the required discharge to be released in a particular reach of the canal network. If a person, who has not paid ISF, still takes the water, he is "stealing" someone else's water, which is not that easy in a closely-knit society like the one found in Aandhi Khola.

3.9 Utilization of Collected Fees

Though the management of the irrigation system was fully transferred to AKWUA last year, it has been collecting ISF and additional money to meet part of O&M costs and for loan repayments for last couple of years. The data regarding on collections is presented in Table A 1.2 below (UMN, 1997).

Table A 1.2 Irrigation Service and Other Fees Collected in Aandhi Khola Irrigation System

Year	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Amount in NRs	32,450	31,970	46,787	66,943	94,410	164,510

Source:

Prior to turnover, part of the amount raised was used to finance administration costs that were to be borne by AKWUA. This subsidy on administration costs was being gradually removed by the UMN. In addition, part of the UMN loan was also paid back out of the same collection. After turnover, AKWUA is

expected to cover all its expenses related to O&M out of its ISF money. Since this is the first year after transfer, it is yet to be seen how the mobilized resources would be utilized by AKWUA.

3.10 Rules, Regulations, Role, and Authority

The AKWUA has full authority to fix ISF rates and corresponding discharges of water, sales of shares, to decide on the collection mechanism etc. However, all crucial decisions have to be ratified by the Board of Directors before enforcement. The AKWUA has a well-defined set of rules and regulations to enforce its decisions, while abiding by its legal constitution.

3.11 Arrears and Dues

The AKWUA has no established procedure for collecting ISF dues other than debarring the defaulter from receiving water. The processes for waiving such fees are also not well stipulated.

4. Sufficiency

The aforementioned figures indicate that the AKWUA has insufficient funds to meet the estimated O&M costs of NRs. 300,000 per year. AKWUA members are expecting grants and donations from the District Development Committees and Village Development Committees to cover the deficit.

Annex 2: Bangeri Irrigation System[1]

The Bangeri Irrigation system is located to the east of Kalaiya in Bara district. It's is bordered by Vhatauda Village Development Committee in the east, Dudhaura River in the west, Kirkicha River in the north, and Banjareya VDC in the south.

The irrigation system is accessible by a seasonally motorable village road from Kalaiya, the main city in the district.

Background

Local farmers constructed the irrigation system in 1940, for supplemental irrigation in the monsoon season.. In 1989, it was selected as one of the sites for the Farm Irrigation and Water Utilization Division (FIWUD) of Department of Agriculture. The mandate of FIWUD enabled it to provide financial assistance for the construction of diversion and control structures with some participation from the farmers. The assistance was extended for the sole purpose of improving the headwork condition. However in 1990, floods in Bolganga River washed away the diversion structure constructed by FIWUD.

1. Main Features

1.1 Physical features

Headwork

The headwork is located on the river Bolganga. It is temporary type diversion structure at sand bed of a lowland river. The earth banks get washed away often, during floods and have to be reconstructed after each flood. As a result, O&M costs are high and unpredictable.

Canals

There is no permanent headwork, the main canal is a partly lined earthen canal.. A few off-takes from the main canal serve as watercourses to individual farms. The main canal is 2 km long while secondary canals measure about 4 km in total.

Although the canals are earth-lined , they have reached a stable condition, hence O&M costs are low. The major problem in the canal network is silt deposition, especially, during monsoon season.

Command Area

The command area of this irrigation system was reported to be 300 ha. However, the irrigable area is only 200 ha. The general topography of the command area is flat and soils are a mixture of alluvial (70%), clay (20%), and silt (10%). No other major problems such as land erosion, water logging, etc., were reported.

[1] Most of the information presented here, unless otherwise cited, is based on an intensive interview with the Chairman of the Bangeri Irrigation system, Mr. Ramashraya Prasad Sah. His input is greatly appreciated.

Major Structures

Major structures in the irrigation system include a head regulator at the intake point (which does not exist at present as it was washed away by the flood), one escape structure at 300m d/s of intake, and 4 cross regulators. Most of the off-takes along the main canal do not have appropriate water control or regulatory structures. Thus, the number of water control or regulatory structures are as low as 0.025/ha. Farmers make use of mud or temporary obstacles to divert water from the main canal to the off-takes.

Water Adequacy

The irrigation system has adequate water for the entire command area, only during monsoon seasons (Jesth - Mansir). The irrigation system remains dry when the water level declines in the river.

Water Reliability and Equity

Overall, reliability of water supplies was reported to be very poor in the system. The system enjoys good supply of water if there is a good pre-monsoon rainfall in the upper catchment of the Bolganga River. The reliability declines when there is drought and there is insufficient water in the river. Similar conditions also exist when there is flood in the river and the temporary diversion constructed by the farmers gets washed away.

Whatever the amount of water diverted to the system, it is equitably delivered to all the farmers irrespective of their location in the command area. Equitable distribution of water is achieved through the principles of rotational water management. Deliveries are made in proportion to the size of landholding of the farmers in different reaches of the canal network and no preference is given to large farmers over small farmers.

Constraints

The diversion structure of the Bangeri irrigation system suffers from the threat of severe flooding. As the headwork is not permanent, the main canal acts as an inundation canal bringing in large amounts of silt that gets deposited in the canal during the monsoon.

1.2 Socioeconomic features

Ethnicity

There are 300 households within the command area of the irrigation system, of mixed ethnic origin mostly from the terai region. The residents comprise of castes such as Shah (25%), Mandal (Dhanuk) (20%), Yadav (15%), Muslim (10%), Kuswaha (10%), Kankar (5%), Thakur (5%), Malaha (5%), Dome (4%), and Bhrahmin (1%).

Migration

The migration pattern is mostly seasonal and temporal. Both inflow and outflow rates are in the range of 20-22 households, i.e. 2-3% per year. People usually go out in search of better employment in the bigger cities of both Nepal and India.

Income sources

The primary source of income in the command area is agriculture. Almost all are dependent on agriculture. A few, particularly those with less land, do side jobs in factories, schools, etc. in nearby cities during the slack period.

Water Users Association

The irrigation system is divided into nine zones. Farmers in each zone have to select a leader. The nine leaders constitute the Irrigation Committee. The Irrigation Committee members elect a Chairman, Deputy Chairman, Secretary, and Treasurer from among the members. The WUA has a two-tiered organization with a Central Irrigation Committee and Branch Committees. The Water Users' Association in Bangeri was formally registered with the Bara Chief District Officer's office in 1991.

There are checks and balances within the organization. This is ensured through the delegation of responsibility to three local leaders belonging to three major political parties.

1.3 Agriculture

Land tenure

The average land holding per household within the command area is 0.6 ha. The distribution of households according to farm size is as follows:

Large farmers	2-3 ha (10%)
Medium farmers	1-2 ha (75%)
Small farmers	< 1 ha (15%)

However, the increasing trend of land fragmentation is expected to increase the proportion of farmers in the lower sized categories.

Tenancy

. Most land in the command area is owner-cultivated. With an increasing number of farmers seeking alternate employment, sharecropping arrangements are becoming more frequent. Sharecropping arrangements are usually informal with no legal recognition

Cropping pattern

At present, the major crops grown in the command area are paddy, wheat, vegetables, maize, and lentils.

Up to the early 1970s, a single crop of monsoon rice was grown. During the other seasons, narcotic crops like hashish and opium were cultivated. Although the cultivation of these crops was banned, the government did not enforce the ban strictly. Farmers obtained good returns from cultivating these crops.
The cultivation of narcotic crops ceased completely by the 1970's as a result of the effective action taken by the government. Since most farmers in the area were obtaining a good income from these crops, the ban on narcotic crops caused an economic crisis for the farmers. Thus, as an alternative, farmers began to cultivate vegetables on a commercial basis from the early 80s. The cropping intensity of commercial vegetables at present is almost 20%.

Wheat cultivation, introduced in the late 70s, has been increasing steadily, and now covers 55% of the command area. Similarly, Maize, which was also introduced in the late 1970s, is presently cultivated on 10% of the area.

The main (monsoon) paddy is grown on 95% of the irrigated area. The spring rice is not grown, due to insufficient water during the pre-monsoon season. Thus, the total cropping intensity is 190% (180%)?.

The crop yields in the irrigated areas are reported to be higher than the national levels. In 1995/96, the average yield of main paddy and wheat was estimated at 4.5 and 3.5 t/ha respectively.

Agriculture support services

The services provided by the Agricultural Development Bank (ADB) and Agricultural Inputs Corporation (AIC) located at Birgunj were reported to be adequate. Other providers of inputs include,, the National Rice Research Center, Parwanipur or private dealers at Kalaiya. Farmers in this area have been trained on modern agriculture technologies under various programs provided through different governmental and non-governmental entities.

Market

Farmers in the command area have good access to markets for their agricultural produce. An all-weather road runs along the south of the command area and links with the townships of Kalaiya and Birgunj. Kalaiya and Birgunj have grain and food processing industries, businesses supplying agricultural inputs and numerous private grain traders.

2. ISF Related Terminology

Some of the commonly used terms related to irrigation service in the area are as follows:

'Paani pot'	Irrigation Service Fee / Water cess /Water charge.
'Purjee'	Slip of paper given to individual farmers who want to irrigate their fields by the authorized person indicating the status of ISF payment and the authority to irrigate.
'Lagat'	Record of irrigated area obtained by the WUA secretary or staff.
'Bakyouta'	Arrears of ISF from previous years.

3. Resource Mobilization for Financing O&M

3.1 Assessment of Resource Mobilization Requirements

The total value of resources mobilized in different forms in 1992 was NRs. 28,000 and was used to pay for Chowkidar, materials, loans, etc. (Freeman, 1992). The WUA allocates costs to farmers on the basis of land units measured in bighas. For each water share, farmers paid NRs. 93.33/ha in 1992. Of this, NRs. 30 was payable in labor equivalent.

In 1996/7, the resource mobilization was equivalent to 20 quintals of paddy. It was mobilized in the form of labor and was mainly used for constructing a temporary diversion structure and for desilting the main canal. About 30cm of silt gets deposited in a stretch of canal 600-700m long after one year of canal operation. Mobilization of resources in kind (paddy) was utilized for labor payments in de-silting jobs such as above. ..

3.2 Assessment of Delivered Irrigation Service

There is no defined mechanism for assessing the delivered irrigation service to individual farmers.

3.3 Relation between Resource Mobilization and Irrigation Service

The amount of resource to be mobilized is assessed to exactly cover the O&M requirements - no more no less. To ensure that the two match, an advance is collected from some farmers and once the work is completed the balance money is collected from all farmers. Thus, the resources required are contributed proportionately by individual farmers as the irrigation service fee.

As an incentive toward contributing the required resources promptly, the WUA has been adopting a motto of "who pays first gets the turn of water first". No additional incentives, are given to the executive members of WUA, even when they collect ISF.

3.4 Forms of Resource Mobilization

The WUA provides the flexibility to make payment in equivalent amount of cash, kind, or labor. . The conversion between these three depends on the market price and is determined by the Central Committee as acceptable to all. A slightly higher price is fixed for those who pay in cash, in order to encourage the beneficiaries to contribute labor.

Based on the extent of O&M requirements, the WUA fixes the amount of resources to be mobilized in proportion to the size of holding of each farmer in the irrigated area. No distinction is made between different crops or uses of water. .

3.5 Relation between ISF and Water Adequacy and Reliability

The resources required for O&M of the system, are obtained by charging irrigation service fee, for irrigation services rendered. Farmers adopt a system of rotational water distribution based on water availability. If there is inadequate water, the deficit is shared by all. Once the schedule for water distribution is decided all farmers abide by it and the water supply becomes quite reliable in the entire system. This mechanism has convinced all the farmers to pay the ISF at the same rate everywhere in the system.

3.6 Farmers' Willingness to Pay

Farmers in the irrigation system abide by the rules and regulations of the WUA. Since the adopted practices of receiving irrigation service in return for contributing resources for O&M have been internalized by all. Farmers have not been reluctant to make the payments, which is usually around NRs. 100/ha.

3.7 ISF Collection Mechanism

The collection of ISF was previously the responsibility of the Chairman of WUA only. However, now the responsibility has been given to three influential representatives of local political parties.

Collection of ISF was reported to be easier when the demand for water was high due to poor water availability.

3.8 Means for Controlling Free Riders

Payment of irrigation assessment is connected to water delivery. If a farmer does not pay ISF he will not be provided irrigation service or will be required to pay fines. In addition, those who pay first get water first. Also, social pressures by other farmers and ostracism have a big influence on controlling the tendency of becoming free riders.

3.9 Utilization of Collected Fees

The resources mobilized are utilized for meeting the O&M requirements at the diversion and desilting the main canal. The entire amount is spent and usually there is no surplus left. . No other activities are undertaken using these resources.. Cash transactions are kept to a minimum Farmers are also satisfied because they have to pay less in cash. In addition, farmers can see the use of their money very clearly.

3.10 Rules, Regulations, Role, and Authority

The ISF is charged on the entire irrigable area within the reach of the irrigation system. The WUA has full authority to deal with such affairs and accordingly has devised many rules and regulations. However, the Chairman, who has been holding this post for over a decade, is very popular and farmers have started accepting his decisions as the general rule.

3.11 Arrears and Dues

The WUA in Bangeri started collecting Irrigation Service Fees on a regular basis in 1991. Basically, no arrears are allowed. The nonpaying farmer either does not get water or faces social pressure and ostracism. For defaulters , no water is issued for three consecutive years.

4. Sufficiency

The Bangeri irrigation system has been successful in meeting all the irrigation management expenses out of the resources contributed by beneficiary farmers. In that sense, it has been self-sufficient and been running the system successfully for almost 10 years.

Annex 3: Chhattis Mauja Irrigation System

The Chhattis Mauja Irrigation System is located southeast of Butwal and north of Bhairahawa in Rupandehi district. It has Sukaura Khola in the east, Tinau Khola in the west, Butwal town in the north, and Indian border in the south. The project area is along the paved road joining Butwal and Bhairahawa.

Background

The irrigation system was constructed in 1800 BS, by Tharu farmers for the supplemental irrigation of monsoon rice. . The construction took place under the leadership of Chheda Tharu of Kumari village (hence, also called Kumari *kulo*).

In 1948, many new branch canals were added to the system and system management procedures were reorganized to allocate water in proportion to land ownership.

The irrigation system has a permanent type bifurcation called Tara Prasad Bhond, which divides water between Sorah Mauja and Chhattis Mauja command areas. The ratio of water division is 40:60.

1. Main Features

1.1 Physical features

Headwork

The source of water for the irrigation system is Tinau River, near Butwal. There is no permanent and reliable headwork for diverting water into the canal network from the source.

The river often changes its course and rate of flow. The river discharge is also reported to be decreasing due to large quantities of silt and boulders being deposited at the intake point.

This has resulted in high O&M cost to ensure sufficient quantities of water to be diverted to the irrigation scheme.

Canals

The canal is mostly earth lined with boulder masonry lining on some critical stretches of the canal.. The main canal is about 11 km long. Direct outlets have been provided from the main canal to the channels going to different villages.

These canals have already reached equilbrium conditions and hence require less maintenance .

The main problem in the main canal is the deposition of silt especially during monsoon season.

Command Area

The irrigable command area from the Chhattis Mauja irrigation system is 3500 ha. The topography is almost flat. The soils are mainly silty and the surface soil texture is coarse in the head and middle regions and fine at the tail end. Seepage and percolation losses are higher at the head compared to the tail end.

The command area of the irrigation system is susceptible to flooding from surrounding rivers. he low lands in the tail portion of the system suffer from submergence and consequently, water logging.

Major Structures

There are no permanent type water control or regulatory structures along the main canal. Most of the 62 outlets are temporary structures with only wooden posts driven into the canal bed to define the width of the opening which is based on the area irrigated by the respective opening .

Water Adequacy

The average discharges at Sorah-Chhatis division structure have been reported to be as follows:

Pre-monsoon season	– 0.8 m^3/s
Monsoon season	- 3.5 m^3/s
Winter season	- 1.0 m^3/s

The available water has generally been adequate. However, shortages have been felt during the monsoon season if there is no rainfall for several days and the discharge in the river declines. In such situations, the WUA has generally adopted the process of rotational water distribution among different outlets. Presently, water is distributed in proportion to shares based on water demand and ability to contribute resources to O&M of the irrigation system.

Water Reliability and Equity

Water reliability has been reported to be very good in the entire irrigation system. The water distribution schedules, as decided by the WUA, are strictly followed. However, reliability in water supply declines in the monsoon when there is flood in the Tinau River. As the water distribution schedules are fixed on the basis of shares - depending upon the land area to be irrigated and the resource contribution in the O&M activities – equity in water distribution is assured.

Constraints

The major constraint of the irrigation system is the temporary nature of the headwork. It requires enormous amount of labor to keep the temporary diversion structure intact and to clean up the silt, gravel, and boulders. Continued silt intrusion into the main canal in monsoon is the major additional problem the beneficiaries have been facing for a long time.

1.2 Socioeconomic features

Ethnicity

The irrigation system serves mixed ethnic groups of Brahmin, Chhetri, Magars, Gurungs, Tharus, Yadavs, etc. Majority of the people have immigrated from the hills of Nepal. Some new settlers have arrived from Northern India as well.

Spatially, the head and middle regions are dominated by Brahmins, Chhetries, Magar, Gurungs, etc. whereas Tharus who in fact were in the head reaches in the 50s now reside in the tail region. .

Migration

After the eradication of Malaria in 1950, the area has experienced a large inflow of immigrants from hilly areas of Nepal and from India. As a result, native groups, such as Tharus have now become a minority. At present, the inflow has almost ceased. Permanent out migration has also been negligible. However, temporary migration, in search of better employment in bigger cities of Nepal and India is common. Nevertheless, there is no shortage of agricultural labor in the area.

Income sources

The primary occupation of the local residents is agriculture and therefore dependency on agriculture is high. The surrounding area does offer some alternative income opportunities but such opportunities are limited .

Water Users Association
During mid 50s, many new settlers migrated from the hills to the area and became beneficiaries of the irrigation system. . In 1958, a three-tiered Water Users' Association was formed with the initiative of the local farmers. In 1979, major revisions were made in the constitution, rules, and regulations relating to irrigation management in the system. In 1989, the constitution was amended again and four outlets were authorized in the u/s of Sorah Chhattis division structure.

The WUA was formally registered with the Chief District Office and obtained legal recognition in 1994. .

The present WUA has a four-tiered organization with Village-level Committees, Area-level Committees, Executive Committee, and a Chhattis-Sorah Joint Committee. The executive members are elected to office.

The WUA has been able to maintain an effective mechanism of checks and balances by clearly defining the roles and responsibilities of all parties concerned at different organizational levels. All rules and regulations have been laid down clearly such that farmers know what is required of them, the need for compliance and the penalties that would be imposed for non-compliance. , The general assembly is held twice a year, during which such information is presented to all farmers. The WUA maintains up-to-date records of all the information that any farmer may wish to obtain.

1.3 Agriculture

Land tenure

The average size of land holding in the command area is 1.0 ha in the head reach and 1.6 ha in the tail reach. The pattern of distribution of farm size shows that about two thirds of the households in the head reach have less than 1ha of land and a similar proportion own more than 1ha of land in the tail reach.

About 14% farmers rent out their lands for sharecropping in the head region. This proportion declines to about 10% and 5% in the middle and tail regions of the system. . Most farms are owner-operated. The most common type of tenancy is sharecropping (Adhiya). Land fragmentation has been increasing in recent times.

Cropping pattern

Up until the early 60s, a single crop of rice was grown in the entire command area.. A three-year drought experienced subsequently, encouraged farmers to diversify to increase food production as well as to minimize risks from such droughts. However a full crop of monsoon rice is grown even today.

Wheat, which was introduced in the late 60s, has steadily gained ground since then. Present coverage of wheat is about 30%.

Maize, which was introduced during the late 70s is rapidly gaining coverage (>40% in the head reach and about 25% on an average at scheme level).

Spring rice is not grown at all. This is due to insufficient water availability during the pre-monsoon season. Although cultivation is possible if the area is limited , the WUA has banned spring rice cultivation, because its high water requirement would result in disproportionate distribution of water.

Agriculture support services

The availability of agricultural credit was reported to be satisfactory. The Agricultural Development Bank (ADB) and Agricultural Inputs Corporation (AIC) are situated in Bhairahawa and farmers have been able to obtain their services. There are private dealers in and around Bhairahwa and Butwal from whom, farmers can obtain required agricultural inputs such as improved seeds, fertilizers, pesticides, etc.

Market

Marketing is not a problem for farmers in this irrigation system. It has good market access by an all-weather road that runs north to south through the command area. The East-West highway also crosses the eastern edge of the command area.

The major markets close to the scheme are in Butwal and Bhairahawa. Both towns have grain and food processing industries, businesses for marketing agricultural inputs and numerous private grain traders.

2. ISF Related Terminology

There is no Irrigation Service Fee (ISF) in Chhattis Mauja Irrigation System as no such charge is collected from the beneficiary farmers. In this system, the farmers contribution for maintaining the scheme is in the form of labor. Some ISF related terms are described below:

'Kulhara' –	This unit expresses a certain share assigned to a member village, and it refers simultaneously to that village's share of water right and associated obligation.
'Khetara' -	Person-day of labor for canal maintenance.
'Khara' -	Amount (fine) charged to those who refrain from their share of *'Kulhara'* for one day. Last year (in 1996/97), the rate of NRs.50 was fixed for *'Khara'*.

3. Resource Mobilization for Financing O&M

3.1 Assessment of Resource Mobilization Requirements

All beneficiaries are required to contribute labor for the maintenance of the irrigation system, i. e. the headwork and main canal only. – The lower level canals have to be maintained by the respective area farmers. The WUA has no direct role either in financing or the implementation. The amount of labor requisitioned is based on 'Khetara', i.e. in proportion to the irrigated lands. The number of 'Khetara' to be contributed from a particular 'Kulhara', depends on the extent of work and the condition of the system at the time of maintenance.. It varies from year to year depending on the need. In emergency situations, the WUA can request for 'Mahajhara', which requires all able bodied men in the household to contribute labor.

The WUA records showed that labor mobilization in the irrigation system in 1995/96 was about 31,500 person days. Of this, 9,000 labor days were spent on maintenance of headworks and 15,000 labor days spent on the main canal, respectively. The rest of the labor was used for maintenance of feeder canals and field channels in different areas of the system command.

In addition to the labor mobilized, farmers also hire loaders and bulldozers for maintenance of headwork. The cost of hiring such equipment is met from collection of 'Khara' and other revenues from sources such as entrance and lecture fees.

3.2 Assessment of Delivered Irrigation Service

No assessment or measurement of the quantity of irrigation services delivered is made in this system. . The irrigation network has been designed to deliver a proportional quantity of water, , depending on the size of opening of the off takes. The openings are pre-determined on the basis of "Kulhara". In water short situations rotational water distribution is practiced by shutting off some of the off-takes in sequence. The decision on which off-takes to be kept open or shut is taken, ahead of water delivery. Once the allotted time of water delivery is finished, it is assumed that the off-takes have received the required amount of water and therefore the irrigation service, even if the water delivered is not adequate. Thus irrigation service delivered is not measured precisely.

In assessing irrigation services delivered, no distinction is made between different uses of water or irrigation for the cultivation of different crops.

3.3 Relation between Resource Mobilization and Irrigation Service

In Chhattis Mauja, resource mobilization is closely linked to irrigation service. Any one who receives irrigation service has to contribute a pre-determined amount of resources for maintenance of the headwork and canal system. It is clear that resources are utilized solely for meeting the cost of O&M of the system. However, the cash expenses are usually met from other income sources of the WUA such as entrance and lecture fees, penalties, etc.

3.4 Forms of Resource Mobilization

Basically, the WUA mobilizes the required resources in two forms: labor and cash. Labor is mobilized in proportion to the share of water received according to "Kulhara". . Cash is usually collected from those who do not contribute the required amount of labor in headwork and canal maintenance work.. However, as there are always absentees, cash payment in lieu of labor contribution has become a regular source of cash income for the WUA. Such cash income has been used to meet other direct costs, such as fuel for bulldozer, salaries of the WUA staff, and so on. Data on cash incomes over the last few years is given in Table A 3 .1 below:

Table A 3.1 Cash Income Sources in Chhattis Mauja Irrigation System (NRs)

Income Sources	1993/94	1994/95	1995/96	1996/97
'Khara' rate per person day	30	35	N40	50
'Khara' total amount	90,000	75,000	105,000	96,000
Entry Fee	18,000	17,500	6,300	4,500
Interest & Fines	3,500	3,000	3,300	2,400
Total	**111,500**	**95,500**	**114,600**	**102,900**

Source: WUA records

3.5 Relation between ISF and Water adequacy and Reliability

Resource contribution to the WUA, in the form of irrigation service fees, is not related to water adequacy or reliability in Chhattis Mauja. Resource contribution is based on the principle that all farmers should make contributions in proportion to the land they irrigate irrespective of water adequacy.

Water reliability is also not considered in the determination of resource contribution. If farmers receive water as per schedule, they have to make the pre-determined contribution.

3.6 Farmers' Willingness to Pay

Farmers have been abiding by the rules and regulations of the WUA and have usually made the predetermined contributions. It is simple and straight-forward – any one receiving water has to make resource contributions. There is no question of willingness. The total value of labor mobilized in 1995/96, @ NRs. 40 per person day, works out to approximately NRs. 1, 260,000, or NRs. 360 per hectare. Farmers have expressed willingness to contribute this amount.

However, the availability of higher paying alternative employment has resulted in a declining trend in labor contribution. . The farmers are willing to pay cash for "Khara" rather than contribute labor, from which they can earn a higher income in alternative work. In order to counteract this trend, the WUA is now thinking of raising the "Khara" rate to a level higher than what one could earn from alternative work outside the scheme.

3.7 ISF Collection Mechanism

The responsibility for collecting *'Khara'* is with the treasurer of the WUA. He keeps records of all the persons in the "Mauja" (irrigating village) who are expected to pay the 'Khara'.

3.8 Means for Controlling Free Riders

Free riders are checked in the Chhattis Mauja Irrigation System. All 'Kulharas" are responsible for mobilizing the apportioned amount of labor from their respective areas. If any "Kulhara' falls short and does not pay the entailing 'Khara', the entire 'Kulhara' is denied water. Rules are strictly enforced and in addition social strictures are put in place to obtain compliance. .

3.9 Utilization of Collected Fees

All collected resources are invested in O&M of the irrigation system. Labor is utilized for maintenance of the headwork and canal system, whereas cash resources are used for meeting operational costs of the

WUA including payment for fuel of bulldozer. Cash expenditure details over last few years are presented in Table A 3.2 below:

Table A 3.2 Income and Expenditure of WUA in Chhattis Mauja Irrigation System (NRs.)

Fiscal Year[2]	1993/94	1994/95	1995/96	1996/97
Staff Salaries	68,000.00	68,600.00	71,000.00	48,000.00
Diversion works: Loader/bulldozer	43,000.00	14,000.00	50,000.00	16,000.00
Miscellaneous	21,000.00	28,000.00	19,000.00	25,000.00
Total Expenditure	**132,000.00**	**110,600.00**	**140,000.00**	**89,000.00**
Total Income	**111,500.00**	**95,500.00**	**114,600.00**	**102,900.00**
Balance (negative)	(20,500.00)	(15,100.00)	(25,400.00)	13,900.00

Source: WUA records

Budget deficits occur mainly due high dependency on "Khara'. The amount of money that would be in collected in form of 'Khara' is uncertain and unpredictable. Hence, it has been difficult for the WUA to plan for future expenditure programs in an effective way. One of the WUA staff informed that he had not been paid for months.

3.10 Rules, Regulations, Role, and Authority

The constitution of the WUA is the sole legislation for all activities within the system. Subsidiary bylaws, rules, and regulations have also been laid out in detail. The WUA, as delegated by the general assembly, has the full authority to implement the decisions relating to irrigation activities in the entire command area.

3.11 Arrears and Dues

No arrears or dues are permitted against the required resource contributions or the "Khara" imposed by the WUA. The defaulters may not be provided water for the next agricultural season.

4. Sufficiency

The process of resource mobilization in Chhattis Mauja Irrigation System has been self-sufficient as long as the maintenance requirements at the diversion had been met from resources collected. . However, the recurrent deficit in cash balance indicates that farmers usually run short of cash resources. Nevertheless, in 1996/97, the WUA was successful in this effort by generating some surplus.

[2] In Chhattis Mauja, the period of a fiscal year is different from that of the government. It runs from the 1st of Magh to the end of Poush.

Annex 4: Kankai Irrigation System

The Kankai Irrigation System located in Jhapa district of Nepal is situated along the East-West Highway between Damak and Birtamod. The settlement is parallel to the road with easy accessibility to the villagers.

Background

The construction of this system was carried out in two phases. The first phase was implemented during 1973-80 and the second phase during 1981-91. The system is under joint management since 1993 and is being gradually turned over to beneficiary farmers. In the process of turnover, the management of the the irrigation system has been benefited by the formation of WUA and the training of WUA officials and beneficiary farmers on the share system, resource mobilization, record keeping, and O&M of the system.

1. Main Features

1.1 Physical features

Headwork

The system has a permanent type diversion weir at the diversion point of Kankai River. The headwork shows signs of construction deficiencies. The headwork trash rack needs regular cleaning because of a high influx of debris and floating logs. During rainy seasons, at least four laborers are kept on standby.

The headwork is capital intensive and therefore rehabilitation will also require a large amount of capital.. However, the operational costs are relatively low.

Canals

The canal network has both lined and earthen stretches. The first, 11.5 km of the main canal is lined with cement concrete and the rest 22.5km is earthen. The system has a canal network of about 164km, inclusive of the : main, secondary and tertiary canals. Some details of the canal network are given at the end of this annex.

Overall, the condition of the canal is better in the phase I area compared to that of the phase II area. The farmers reported occasional seepage and slides in the canal network (deep cutting from Bhalu khola to Sharda khola).

Command Area

The first phase developed a command area of 5000 ha and the second phase 2000 ha giving a total of 7000 ha. The topography is flat with slope of about 1/800. Soils in upper areas t are 'Brown Forest Soil' with high fertility. Soil texture varies from loamy to sandy loam but most parts of the command area have 'Alluvial' soil. The Tail region has soils, highly suitable for Paddy, i.e. 'Paddy soils'. Paddy cultivation is very common and has been grown for many years in the past.

Major Structures

Regulating structures, such as steel gates exist at all off take points from the Main Canal as well as Tertiary

off takes from Secondary Canals. Total number of such regulating structures is 322. The structural density, inclusive of all other subsidiary hydraulic structures, is as high as 1/5 number per ha. However, 40 % of the steel gates are not functioning due to inappropriate maintenance.

Similarly many cross drain structures, mainly siphons, have been constructed as the canal network crosses many drains that are subject to flash floods. The maintenance of siphons, escape structures, and their regular cleaning is is costly.. As the the drains are susceptible to flash floods,the siphons suffer from a higher probability of damage. . The drains are in need of protection at numerous places.

Water Adequacy

The design discharge of the irrigation system is 10.6 m^3/s, with a duty of 1.06 lps/ha. The maximum discharge possible at present is 6.2 m^3/s. There is an acute shortage of water during the pre-monsoon season for early paddy n. Water shortages are caused both by low flow (7.7 m^3/s) at the source and high water requirement for early rice cultivation. A l rotational water supply of duration of two years has been adopted as one of the measures to deal with water shortage.

Water shortage has also been felt during grain-filling stage of Monsoon rice, when there is no rainfall for several days. Rotational water distribution among secondary canals is adopted during such times.

Water Reliability and equity

Overall, water reliability is good, in Kankai. However, during water shortage, reliability declines in the tail regions. Since many of the regulating steel gates are non-functional, reliability also varies with topography of the command area, i.e. lower level canals withdraw much of the water resulting in the supply becoming unreliable in canals located at higher elevations. Moreover, during pre-monsoon season, the unreliable flow of water in the river itself affects water reliability.

Water shortage in the tail regions in both the main canal (S10, S11, S12) and the extension area (S15, S16, S17-20) has led to considerable inequity in water distribution.

Constraints

The Kankai Irrigation System would be affected by the flooding of the Kankai River, particularly at the eastern edge of the command area. Drainage problems affecting the low-lying tail regions can cause the submergence of these areas during rainy seasons.

Soil erosion is not a major problem in the area. . Silt intrusion is controlled by the settling basin.

1.2 Socioeconomic features

Ethnicity

Altogether, there are 7,146 households in the command area. The Kankai irrigation system serves multi-ethnic groups of Rai, Limbu, Brahmin, Chhetri, Sattar, Rajbanshi, etc. The spatial distribution of different groups is as below:

Northern Region : Brahmins and Chhetries
Middle Region : Rai, Limbu, Tamang, and Tajpuria
Tail Region : Sattar, Rajbanshi, Meche, Koche, Dhimal, etc.

Migration

The Sattar, Rajbanshi, Meche, Koche and Dhimal are native residents of this area. During 1964-76, there was a large inflow of immigrants from hilly areas (Ilam, Taplejung, Panchthar) of Nepal and from India (Assam) who settled here. This large inflow of immigrants has caused native resident groups to become a minority in the area.

The rate of immigration is declining and is almost insignificant at present. Permanent outward migration is also insignificant. However, temporary migration, in search of employment in bigger cities of both Nepal and India, was reported to be on rise. Nevertheless, there is no shortage of agricultural labor in the area.

Income sources

The primary income source of the households in the command area is agriculture and related business. There are very few a alternative opportunities in the area due to the absence of other trades or industries. Persons who have no regular employment work as laborers on a daily wage basis during slack time. Persons in the southern region go to India, while those in the northern region s go to Biratnagar or Kathmandu, to find work.

Water Users Association

A WUA representing the entire irrigation system, established in 1993, held its next election in 1996. It is lawfully registered with the Jhapa Chief District Officer's office. It has three-tiered organizational structure with a Central Committee, Secondary Canal Committees, and Tertiary Canal Committees. The executive members are selected either by general consensus or by election.

The presence of the general assembly, well-articulated rules and regulations in accordance to WUA's constitution, have been very effective in maintaining the necessary checks and balances within the organizational structure.

Under the aegis of the present Irrigation Policy, the General Assembly of Kankai farmers has ratified the proposal of the main canal committee to take over the management of the system, excepting the main canal, by 2001. To meet the target, segments of canal network serving about 1,500 ha were required to be turned over to the respective beneficiaries' committees every year. Beginning with partial and gradually moving to full turnover, the following canal segments of S-0, S-9, S-10, S-11, S-12, and T-12 serving 300, 127, 259, and 144, 385, and 28 hectares of land respectively, have already been turned over to beneficiary organizations. The farmers themselves are managing all these subsystems by mobilizing local resources.

1.3 Agriculture

Land tenure

The average land holding per household with a family size of 7 members is 0.98 ha. The farm size distribution pattern indicates that the majority (71%) of the farmers in the command area own less than 1ha. of land. Lands were also distributed to the landless farmers by the government in 1975 at the rate of 1 ha per family. However, about 19 % farmers are still landless. Other details are given in Table A 4.1 below:

Table A 4.1 Pattern of Landholding in Kankai Irrigation System

Size of Landholding	Percentage
Landless	19
0-0.5 ha	24
0.5 –1.0 ha	28
1.0 – 5.0 ha	22
> 5 ha	7

Source:

Local residents also reported that fragmentation of land is on the rise. The proportion of tenants, mostly sharecroppers , is decreasing, and thus most of the lands are owner-operated.

Cropping pattern

The existing cropping pattern, presented below, shows a significant extent under early paddy. However, farmers' strong desire to grow early paddy is constrained by scarcity of water and non-availability of improved seed varieties. The farmers prefer improved varieties for the pre-monsoon season, because it matures faster and hence cultivation of monsoon paddy will not be affected..The current cropping pattern is shown in Table A 4.2 below.

Table A 4.2 Cropping Pattern in Kankai Irrigation System (1996/97)

Irrigated Crop	Season	Area in ha	Yield t/ha
Early Paddy	Spring	2000	4.0
Paddy	Monsoon	7000	4.4
Wheat	Winter	3000	2.3
Maize	Winter	800	1.7

Source:

Jute cultivation has declined significantly, compared to what was envisaged at the time of designing the irrigation system. Jute is being replaced by paddy, due to the poor prices obtained for jute and the lack of marketing outlets.

Although the extent under wheat has increased slightly, it has not reached potential levels due to the following reasons:

- Due to the problem of preservation of wheat seed it has to be procured at high prices.
- Cost of cultivation of wheat is higher. This is because of the higher input requirements, particularly for insecticides, pesticides, chemical fertilizer, etc. and also because of the extra care needed for wheat cultivation, since over or under-irrigation can cause a significant decline in yield.
- The consumption of wheat is not very common in the command area and therefore it is difficult to market this crop.
- Market price of Wheat is poor.
- Storage of wheat is difficult and costly (as compared to rice).

The extent under maize, especially during the pre-monsoon season is significant. This is mainly because of increased cropping intensity due to an increase in population density.

Other crops such as, *'Musuroo'*, oilseed, linseed and *'Khesari'* are also cultivated in the command area, mainly to meet the local household demand for such products

Agriculture support services

The Agricultural Development Bank (ADB) and Agricultural Inputs Corporation (AIC) are situated at Bhadrapur, a very close by township. However, many farmers expressed dissatisfaction about the agricultural credit programme. . The nearest location for obtaining agricultural inputs is the Chandradangi Agricultural Farm, but services here are inadequate.

Several training programs were conducted while implementing Joint Management activities. Other agencies and programs like District Agricultural Development Office, Special Program for Food Production in Support of Food Security in Nepal (SPIN), etc. have also given training to farmers in the locality. Nevertheless, farmers complained that most of the training was not based on their actual need.

Market

There is a good network of trunk and service roads for the main, secondary, and tertiary canals, linking with the East-West highway that runs adjacent to the command area. It provides very good access to major markets nearby, i.e. Birtamod (18 km), Damak (20 km), and Bhadrapur 34 (km).

2. ISF Related Terminology

Some of the ISF related terms in use are described briefly below:

'Paani pot' – Irrigation Service Fee / Water cess / Water charge

'Lagat' - A record of irrigated area under paddy, obtained at the end of each rice season by "Amins" or WUA, in the case of areas turned over.

'Bakyouta'- Arrears of ISF pertaining to previous years.

3. Resource Mobilization for Financing O&M

3.1 Assessment of Resource Mobilization Requirements

The Kankai Irrigation Office prepares an estimate of the work to be done under O&M for each year and makes a request for the required budget. However, the budget disbursed has never been in accordance with the amount requested. The expenditures made from the allocated budget (being less than demanded, the entire allocation is usually spent) over last few years are presented in Table A 4.3 below:

Table A 4.3 ***O&M Budget Expenditures and Estimation of Farmers' Contribution[3] (NRs)***

Fiscal Year	O&M Budget Expenditure	Estimate of Farmers' Contribution	Total
1993/94	48,00,000/-	30,00,000/-	78,00,000/-
1994/95	95,00,000/-	50,00,000/-	145,00,000/-
1995/96	69,00,000/-	40,00,000/-	109,00,000/-
1996/97	71,29,000/-	55,00,000/-	126,29,000/-

[3] As a part of cost sharing under joint management.

1997/98	19,60,000/-	60,00,000/-	79,60,000/-

Source: Project records

3.2 Assessment of Delivered Irrigation Service

The delivered irrigation service is assessed in terms of irrigated area for the rice crop, which is popularly grown in the entire command area. Nothing is charged for other uses of water (e.g. for fishponds, domestic uses, or even irrigation for crops other than rice). The flat rate charged for received irrigation service in Kankai is NRs. 100/ha/rice. The relevant irrigation office itself enforces this rate.

The areas that do not get reliable water supply are excluded. The area assessed for rice cultivation and the corresponding amount of ISF assessed and collected are given in Table A 4.4 below:

Table A 4.4 ISF Assessment and Collection in Kankai Irrigation System

Fiscal Year	Season	Assessed Area (ha)	Amount Due (NRs.)	ISF: Amount Collected (NRs.)	Collection Efficiency
1993/94	Spring Monsoon Total:	1316 2377 3693	369,300/-	25,763/15	7%
1994/95	Spring Monsoon Total:	1091 2774 3865	386,500/-	182,077/50	47%
1995/96	Spring Monsoon Total:	1315 3363 4678	467,800/-	295,149/25	63%
1996/97	Spring Monsoon Total:	1321 3361 4682	468,200/-	215,154/53	46%
1997/98	Spring Monsoon Total:	1288 4336 5624	562,400/-	315,540/75 till May	56%

Source: Project records

3.3 Relation between Resource Mobilization and Irrigation Service

The trend of budgetary expenses compared to ISF collection is given in Table A 4.5 below:

Table A 4.4 O & M Expenditure and ISF collection

Fiscal Year	O&M Expenditure (NRs.)	ISF Collection (NRs.)	ISF as a Percentage of O &M Expenditure
1993/94	48,00,000	25,763	0.5 1.92 4.28 3.02
1994/95	95,00,000	1,82,077	16.1 (till May)
1995/96	69,00,000	2,95,149	
1996/97	71,29,000	2,15,154	
1997/98	19,60,000	3,15,540	

Figure A 4.1 ISF Collection in Kankai Irrigation System

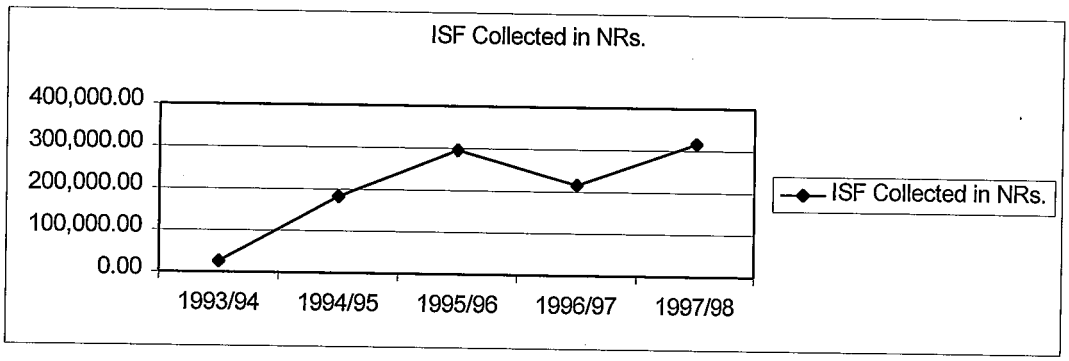


Figure A 4.2 O & M Expenditure in Kankai Irrigation System

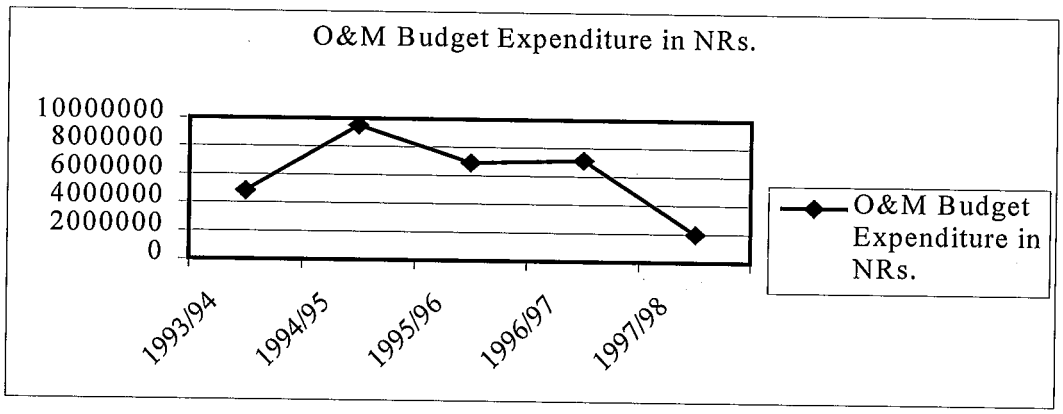
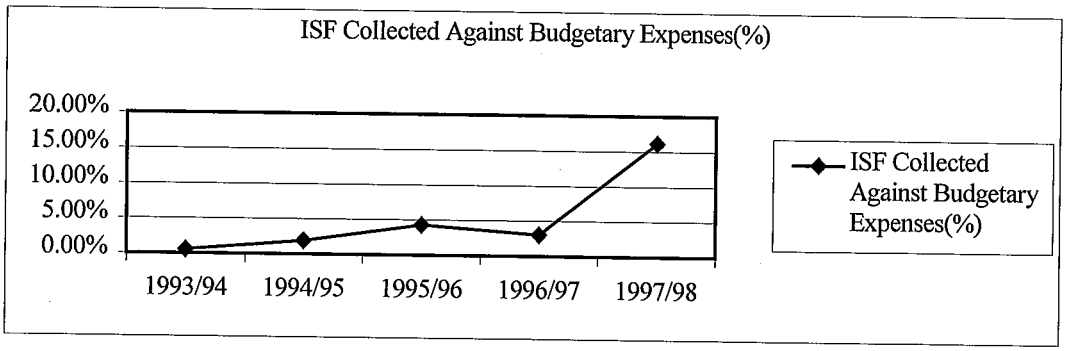


Figure A 4.3 ISF Collection as a Percentage of O & M Expenditure in Kankai Irrigation System



As seen from the graphs above, there is no relationship observed between collected ISF and the budgetary expenditures. In fact, O&M budgetary expenses are declining as the rate of ISF collection is increasing.

3.4 Forms of Resource Mobilization

Kankai irrigation system has two types of resource mobilization. An Irrigation Service Fee , in cash is collected from beneficiary farmers @ Rs.100/ha for irrigated area of rice. In addition, labor or an equivalent

amount in cash is mobilized for canal cleaning, etc. in the sub-system not yet turned over. Last year, mobilization in the latter form was equivalent to @ NRs. 45/household at Shibgunj.

Different forms of resource mobilization also take place at different tiers of the WUA.

At the tertiary canal level: Labor is mobilized for canal maintenance work, in variable amounts, in almost all tertiary canals. The basis for such labor mobilization also varies from one canal to another. . In most cases, e.g. S5T1, To12, etc., landholding size is the usual basis. The number of households is also used as a basis, in a few other cases..

Similarly, the process of ISF collection also varies at different levels.. In most cases, farmers first decide how many laborers per household have to be mobilized for the targeted work of canal maintenance. Based on this assessment, farmers get together at some pre-determined location and start the canal cleaning work jointly. Attendance is marked for all of those who participated. This work is continued till such time as the canal is brought back to its original state. To bring the canal to fully functional status,it may take one to three days.

In other tertiary canals, such as in SoT (1-10), the whole canal stretch is divided into various segments and assigned to different groups of farmers depending upon the size of their landholdings. Farmers, usually, are given one week to complete the canal cleaning work in their respective sections.

At the secondary canal level: Resources are also mobilized for canal cleaning work at secondary level. However, it is not a regular process and is not practiced uniformly in all secondary canals. When there was a sufficient budget with the Kankai Irrigation Office, the office cleaned the silt from the canal. As the O&M budget allocation to Kankai declined ; the farmers could not depend on the irrigation office to get the work done in the same way. That is why; some Secondary Canal Committees of the beneficiaries have started mobilizing their own labor.

In secondary canals, the labor mobilization requirements are very high. As many laborers are not readily available , the farmers have adopted a practice of collecting cash. Depending on one's wish, a donation is collected in some secondary canals, e.g. S15, S10, etc. whereas, in some, e. g. S9, cash is collected on the basis of landholding size (NRs. 25/Bigha or 37.5/ha).

At some locations , the Secondary Canal Committees also assist in desilting tertiary canals. In 1996, the S9 Committee requested the tertiary level committees to carry out desliting in all of its tertiary canals. For strict enforcement, water was not released to tertiary canals until they were properly cleaned. This mechanism of withholding water till the canals are desilted appeared to work well. A few tertiary canals did not receive water during the pre-monsoon season for more than one week, as the respective farmers did not clean them in time. Similarly, S0 Committee also makes sure that all tertiary canals in its area are properly desilted before water delivery. In March 1998, S0 Committee even distributed NRs. 500 to each of its tertiary canal committees for meals during the labor mobilization for desilting work .

At the Central Committee Level: The Central Committee also has its own sources for raising funds. Although the WUA members claim that they would use their fund to undertake canal maintenance work if necessary, the available fund was found to be insufficient to carry out such work.. Up to now the fund, has been used for meeting only the administration costs of the WUA (Please see the WUA balance sheet under heading 3.9).

3.5 Relation between ISF and Water adequacy and Reliability

The general trend has been of a continued increase in ISF collections after the implementation of joint management and turnover of some secondary canals to the respective Water Users Groups. Adequacy and

reliability of water are reported to have improved slightly with joint management practices and increased participation of farmers in water distribution.

As it has been experienced, the "ISF collections" and "water adequacy and reliability" have been mutually supportive. If one improves, the other also improves and vice versa.

3.6 Farmers' Willingness to Pay

In relative terms Kankai farmers are willing to pay except in areas where water is not reliable. As far as the matter of ISF collection is concerned, no other options have been given except to pay in cash.

3.7 ISF Collection Mechanism

The ISF collection mechanism is slightly different in areas turned over compared to areas not yet turned over. In areas that have been turned over , the water users groups at the lowest level collect ISF by themselves. Whereas, in areas not yet turned over "Amins" or some collectors assigned from the Kankai Irrigation Office do the work based on office's assessment with verification from the relevant water users groups.

The WUA has a very small number of trained but highly dedicated manpower The Kankai Irrigation Office has also trained its own manpower and provided them with necessary resources. However, such resources do not seem to be sufficient and the staff appear to have little motivation to engage in ISF work.

3.8 Means for Controlling Free Riders

Free riders in the system, usually do not pay the ISF or claim not to have received the irrigation service even when they had obtained such service. To control free riders, members of the respective water users group undertake field verification to determine whether the irrigation service was provided or not, during the relevant crop season. Farmers together with the WUA ensure that the recipient of irrigation service pays ISF, using all means at hand including social pressure.

3.9 Utilization of Collected Fees

As stipulated in the Irrigation Policy, the entire ISF amount collected by the Kankai irrigation Office and 50% of the ISF amount collected by the farmers in systems that have been turned over is deposited with the general treasury of the government. The balance 50% of the ISF collected by farmers is retained by the farmers themselves. This retained sum is expected to be used in the operation and maintenance of the respective canal system. However, some of the farmers as well as the Kankai Irrigation Office, feel that there is some ambiguity in the arrangements made for the effective utilization of these funds. There are no clear rules or guidelines established for the proper use of the money collected. Similarly, no plans for O&M expenditure have been made by WUA so far. Details of income and expenditure of the central committee of WUA in fiscal year 1996/97 is presented below:

Table A 4.5 WUA's Balance Sheet for the Fiscal Year 1996/97

Income	Amount in NRs.	Expenditure	Amount in NRs.
Bank balance from last year	1.837.50	Daily allowance	1.500.00
Membership fee	634.50	Services	342.00
Applications	130.00	Rent	600.00
Fee from picnickers	4,000.00	Stationary	1,751.00
Water tax (part of 10% going to the central committee)	2,000.00	Fuel	1,350.00
Rental of equipment	3,450.00	Contingencies	4,575.00

Miscellaneous	8,117.00	Furniture	4,730.00
Balance	968.00	Government tax	500.00
		Maintenance	3,400.00
		Miscellaneous	453.00
Total	**21,137.00**	**Total**	**19,201.00**

Farmers appear to be lacking sufficient foresight in the appropriate utilization of collected ISF.

3.10 Rules, Regulations, Role, and Authority

Most of ISF related and other joint management activities are being followed in accordance to Irrigation Regulation, 2045 and Irrigation Policy, 2053. However, the WUA itself can decide how the collected ISF should be apportioned to different tiers of the WUA.. The existing rules of WUA for apportioning ISF in turned-over systems are as follows:

- 50% - is deposited with the Central Treasury at the end of each month
- 10% - is sent to the WUA Central Committee. (However, not all sub committees are abiding by it).
- 2% - from regular dues and 10% - from arrears are given to the individual collectors as incentives
- Remaining amount – retained in the respective sub committee fund.

3.11 Arrears and Dues

When the farmers do not pay their share of ISF even up to the end of Jesth, the amount is deemed to be ISF arrears. It has to be paid by the service receiver unless the individual concerned can prove that he did not receive the irrigation service. In order to do this , farmers have to send in a written complaint stating that their fields were not irrigated. A team from the Kankai Irrigation Office will investigate such complaints to determine whether such services were provided or not during the applicable season. If the complaint is verified to be true, , the ISF is written off or waived.

Previous inaccuracies in irrigated area assessments have made the task of collecting arrears more difficult.

4. Sufficiency

In turned over systems such as S9 and To12, the respective farmers' associations are collecting money for carrying out cleaning and desilting work on their own. (e.g. in S9. NRs. 1,935/- out of NRs. 40,241/62 collected as ISF was spent on canal cleaning work) . At the system level, the adequacy of ISF for meeting O&M cost is presented in the following graph.

Figure A 4.4 O & M Budget Expenditure and ISF Collection in Kankai Irrigation System

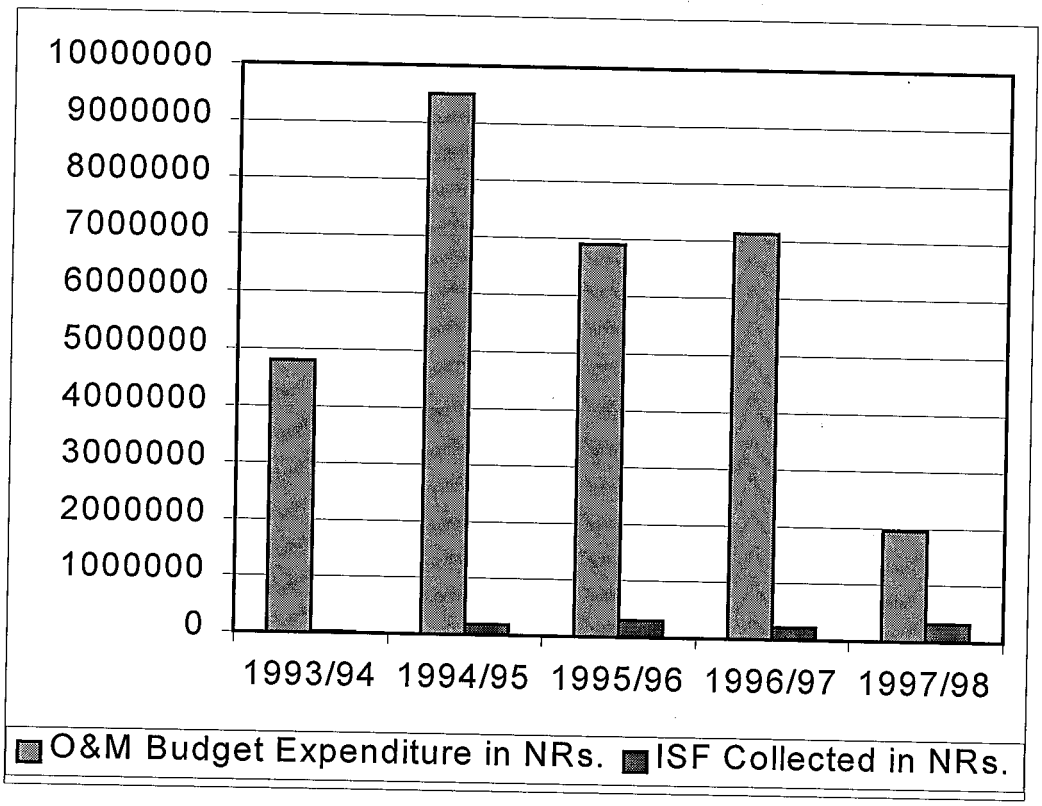


Table A 4.6 Details of Canal Featuresin Kankai Irrigation System

Branch Canal Name	Canal Length (km)	Canal Capacity (lps)	Area Irrigated (ha)	Construction Phase	Status
S0	4.65	345	300	2	Turned over
S1	5.80	851	746	1	
S2	3.90	259	227	1	
S3	3.40	425	372	1	
S4	4.65	477	418	1	
S5	6.60	91	798	1	
S6	2.15	154	136	1	
S7	1.70	262	230	1	
S8	8.70	704	676	1	
S9	1.20	144	127	1	Turned over
S10	3.32	295	259	1	Turned over
S11	3.20	165	144	1	Turned over
S12	11.10	441	385	1	Turned over
S13	2.00	310	214	2	
S14	5.60	603	416	2	
S14A	2.00	315	217	2	

S15	4.20	666	459	2	
S16	3.60	474	327	2	
Total	**77.77**	**6981.00**	**6450.60**		
S17	6.20			Cut-off area	
S18	1.45			Cut-off area	
S19	3.10			Cut-off area	
S20	3.00			Cut-off area	
Design Duty:	**1.08**	**Lps/ha**	**2015.4**		
Canal Density:	**4.02**	**M/ha Main Canal**	**8466.00**		
	9.19	**M/ha Branch Canal**			

Table A 4.7 Details of Main Tertiary Canals

Main Tertiary Canals	Canal Capacity (lps)	Area Irrigated (ha)
To1	83	72.7
To2	19	16.6
To3	28	24.8
To4	32	27.8
To5	12	10.1
To6	45	37.2
To7	19	16.6
To8	20	17.7
To9	52	45.5
To10	26	22.4
To11	39	33.8
To12	31	27.6
TA1	25	23.1
TA3	29	25.8
TA4	24	21.7
TA5	22	19.0
TA6	25	23.1
TA7	25	23.1
TB0	26	23.0
TB1	33	29.3
TB2	26	23.0
TB3	38	32.9
TB4	32	28.4
TB5	38	33.5
TB6	22	19.2
TB7	28	24.3
TB8	25	21.9
TB9	22	19.6

Main Tertiary Canals	Canal Capacity (lps)	Area Irrigated (ha)
TB10	74	67.1
TB11	17	14.8
TB12	52	45.8
TE1	84	58.0
TE2	7	5.0
TE3	18	12.0
TE4	98	68.0
TE5	90	62.0
TE6	200	138.0
TE7	15	103.0
TE8	90	62.0
TE9	39	27.0
TE10	119	82.0
TE11	87	60.0
TE12	10	7.0
TE13	27	17.0
TE14	22	15.0
TE15	33	210.0
TE16	30	21.0
TE17	33	23.0
TE18	49	34.0
TE19	32	22.0
TE20	51	35.0
TE21	47	32.0
TE22	20	14.0
TE23	54	37.0
Total	**2244.00**	**2015.40**
Duty 1.11 Lps/ha		

Annex 5: Marchwar Lift Irrigation System

The Marchwar Irrigation system, surface list type, is located in Rupandehi district in Southwest of Bhairahwa. The access to the area is through a 20-km gravel feeder road joining Bhairahwa-Lumbini road with the district headquarters. .

Background

The HMG/N's requested UNCDF's assistance for the construction of this irrigation project, which began in 1980. Under phase I, a pump station was constructed and the main distribution system and access road were partially completed.. Under Phase II, which continued till June 1997, the physical infrastructure necessary to provide irrigation facilities for 2815ha by a low level canal and 1000ha by an upper level canal were completed.

In February 1998, the management of the whole irrigation system was transferred to the WUA.

1. Main Features

1.1 Physical

Headwork

The pump station for this lift irrigation system is situated at the confluence of Dano and Hariya rivers. The pump station has 10 pumps. The O&M costs of the pump station is very high. The recurring electricity charges for operating these pumps are given below:

Table A 5.1 Electricity Cost for Operating the Pumps

Fiscal Year	Electricity Charges in NRs.
1993/94	1,000,000
1994/95	1,200,000
1995/96	1,248,000
1996/97	1,518,000

Source: Performance Measures Study, IIMI Nepal. 1998

Canals

The canal network has both lined (single brick lining) and earthen stretches. Total length of canals in the system is 55.86km in lower canal system in addition to the main canal that measures about 2.8km. The network consists of main canal; primary, secondary and tertiary canals; and watercourses and field channels below block outlets. These canals suffer from frequent leakage and breakage during canal opening in the beginning of monsoon season caused by roots of numerous '*sisho*' planted along the banks.

There is no silt problem in the irrigation system.

Command Area

The irrigable area as determined by the project is 2815 ha, out of which only 2200ha is presently irrigated. The general topography is flat with no soil erosion problems.

Major Structures

As water is distributed proportionally in the canal system, no regulating structures have been provided. The total number of hydraulic structures in the irrigation system is 337. Thus, the density of hydraulic structures is 1/8 no per ha (one structure per eight hectares). Cross drainage structures are less than the required number.

Water Adequacy

Water availability in the source has been reported to be adequate for the revised assessment of the command area of 2815ha. However, some water shortage has been felt during canal breakage usually in the beginning of monsoon season.

As the irrigation system is based on proportional water distribution, there is very limited flexibility in canal operation and at least 70% of the design discharge (6.15 cumecs) has to be pumped in order to allow the water to flow into the canal system. This type of design has made operational tasks more difficult for the WUA.

Water Reliability and Equity

Overall water reliability in the system is good. Water reliability declines (mainly due to canal breakage) during land preparation for monsoon rice when the water requirement is high and critical.

Since the water is distributed in proportion to the area irrigated by each of the outlets, equity is pretty well maintained. No preference is given to the size of an individual's landholding.

Constraints

The irrigation system suffers from flood threats of Tinau River at the lower regions of the command area. The problem of water logging was found to be quite severe at some locations.

1.2 Socioeconomic

Ethnicity

The project area contains multi-ethnic groups composed of Yadav, Brahmin (Shukla), Muslims, Lodh, etc. Yadavs were reported to be in the majority.

Migration

Population inflow into the command area is almost zero. Permanent out migration from the command area is also reported to be negligible. Nevertheless, temporary migration in search of better employment opportunities in bigger cities of both Nepal (Butwal, Bhairahwa, Narayanghat, Kathmandu) and India (Punjab) was found to be very common.

Income sources

The primary occupation of the local residents is agriculture and therefore dependency on agriculture is also high. About 95% of the total population is engaged in farming activities.

Alternative income generating opportunities are almost nonexistent within the command area. People go to different areas, depending on an individual's capability and qualification, in search of work. - Those with no education go to Punjab, India to work as laborer and those with some education go to Butwal or Bhairahwa to work in some industries and those with higher education go to Kathmandu.

Water Users Association

The WUA in Marchwar irrigation system was legally registered in Rupandehi Chief District Officer's Office in 1993. The WUA has a 3-tiered organization with one Main Committee, eight System Committees and 130 Block Committees. In addition, it also has four other sub-committees assigned for different sets of tasks.

Executive members of these committees are appointed by an election held every 3 years. Checks and balances within the organization are maintained through Marchwar Assembly that meets at the end of both winter and monsoon seasons.

1.3 Agriculture

Land tenure

Average family size in the command area is of 7 members. Likewise, average land holding per household is 1.2ha. The farm size distribution pattern is shown in Table A 5.2 below.

Table A 5.2 Farm Size Distribution in Marchwar Irrigation System

Size Class	Percentage of Farmers
Landless	2.3
0-1 Ha	60.0
1-5 Ha	35.8
5-10 ha	1.7
> 10 ha	0.2

Source:

Almost 93% of the people cultivate their own land. About 7% are share tenants.

Fragmentation of land in the command area has been reported to be on the rise due to separation of families and increase in population.

Cropping pattern

The area cultivated in winter seasons is 60-70% of the total command. This is more than what has been recommended in the project paper (40%). Area under wheat is almost constant but area under mustard and

pulses has been increasing slowly. Sugarcane cultivation is confined to certain locations where water availability is unreliable. The sugarcane extent has remained the same. The extent under different crops over last few years is given below:

Table A 5.3 Area Under Different Crops in the Marchwar Irrigation System (ha)

Year	M. Rice	Wheat	Sugarcane	Oilseed	*Pulses*
**1993/94*	*626*	*300*	*na*	*Na*	*na*
1994/95	*2,268*	*1,800*	*20*	*30*	*32*
1995/96	*2,576*	*2,050*	*25*	*35*	*38*
1996/97	*2,805*	*2,255*	*225*	*50*	*45*

Source: :

Table A 5.4 Yields of different crops grown in the system (m t/ha)

Year	M. Rice	Wheat	Sugarcane	Oilseed	Pulses
**1993/94*	3.20	2.30	Na	Na	Na
1994/95	3.40	2.60	40	0.6	O.5
1995/96	3.40	1.80	40	0.6	0.5
1996/97	3.85	1.80	40	0.6	0.5

Source:

Table A 5.5 Crop Prices in Nepal Rupees/1000Kg**

Year	M. Rice	Wheat	Sugarcane	Oilseed	Pulses
**1993/94*	6,250	5,280	NA	NA	NA
1994/95	7,050	6,800	2,000	16,700	22,100
1995/96	7,700	7,200	2,000	21,700	28,000
1996/97	7,250	7,500	1,900	21,300	28,000

Source:

* Low coverage this year, as rehabilitation work was not completed .

** Source: Agricultural Marketing Bulletin, DOA, HMG.

Agriculture support services

Agricultural Development Bank (ADB) and Agricultural Inputs Corporation (AIC), are both situated at Bhairahwa. However, farmers expressed dissatisfaction due to inadequate availability of required agricultural credit . Farmers procure necessary agricultural inputs from AIC, Bhairahwa. Sometimes, the WUA arranges for the seeds and fertilizers, etc for the farmers in the command area. For instance, last year, the WUA bought 30 bags of wheat seeds to be distributed to the needy farmers.

Several training programs had been organized by the Marchwar Lift irrigation Office and associated consultants in the course of management transfer. Other government agencies like District Agriculture Development Office and non-governmental agencies like RSDC (Rural Self-reliance Development Company) have also given training to farmers in the command area. Nevertheless, farmers complained that the process of selection of participants for the training was not done properly.

Market

A graveled service road along the main canal connects the command area to Bhairahwa, which is the biggest market in the area. It is located at about 25km from the command area. The second market is Butwal, which is 47km away.

2. ISF Related Terminology

Some of the commonly used terms in relation to Irrigation Service Fees are briefly described below:

- *`Paani sewa shulk'* – Irrigation Service Fee / Water cess / Water charge.
- *`Lagat'* - Record of irrigated area collected by the WUA secretary or staff.
- *`Bakyouta'* - Arrears (Amount of ISF to be collected from balances of previous years).

3. Resource Mobilization for Financing O&M

3.1 Assessment of Resource Mobilization Requirements

The cost of electricity for operating the pumps is approximately NRs. 1,500,000 and the corresponding operators' salary is about NRs. 200,000 (salary of 8 operators and 3 guards @ NRs. 1,600/- per month), annually.

The WUA has a clear idea of the costs of operation. However, it does not have an estimate of the maintenance requirements and associated costs. According to the agreement of management transfer, WUA was expected to progressively meet 10%, 20%, 30% of the electricity cost in the years following turnover but at present the WUA is very reluctant to do so and wants the government to pay the entire amount. It does not have any plan to meet the cost of electricity cost.. Presently, Butwal Power Company has been given a maintenance contract for the powerplant for 30 months, hence, for this period WUA is relieved of this expenditure. However, the cost of canal maintenance is to be borne by the WUA itself.

3.2 Assessment of Delivered Irrigation Service

The Irrigation Service Fees are charged on an annual basis from the landowner and not from the tenant. A flat rate of NRs.180/ha/year is assessed on the maximum irrigable area in a year, assuming rice cultivation on most lands. There is no assessment made of the delivered irrigation service. Even though members of the WUA feel that different rates should be fixed for different crops they are unable to implement it because of the lack of t manpower to make such assessments in the entire irrigated area. The assessments made in last few years are given in Table A 5.6 below: :

Table A 5.6 ISF Assessments and Collection Efficiency (NRs.)

Fiscal Year	Assessed Area (ha)	Rate Per ha	Amount Due	ISF: Amount Collected	Collection Efficiency(%)
1993/94	-	-	-	-	-
1994/95	-	-	-	-	-
1995/96	2,268	60	1,36,080	58,287	43%
1996/97	2,576	120	3,09,120	72,657	24%
1997/98	2,805	180	5,04,900	1,15,378 till March	23%

Source: IMT Impact Assessment Study, 1998. IIMI, Nepal

3.3 Relation between Resource Mobilization and Irrigation Service

A comparative tabulation of O&M expenses, ISF assessment, and collection is given in Table A 5.7 below:

Table A 5.7 O&M expenses and ISF collection (NRs.)

Fiscal Year	O&M Budget Expenditure Inclusive of Electricity Costs	ISF: Amount Collected	ISF Assessment as Percentage of O&M Expenses (%)	ISF Collection as Percentage of O&M Expenses (%)
1993/94	4,720,675	-	-	-
1994/95	5,272,671	-	-	-
1995/96	5,177,535	58,287	2.6	1.12
1996/97	4,782,617	72,657	6.5	1.52
1997/98	NA	115,378	-	-

Source: Performance Measures Study, 1998. IIMI, Nepal

Though the available data are insufficient to draw any relationship between resource mobilization and ISF, it is quite evident that even the total ISF assessment covers less than 7% of the O&M expenses. The O&M costs on average are high and are estimated at NRs. 1,780 per hectare.

3.4 Forms of Resource Mobilization

In addition to ISF, the WUA has been able to generate a substantial amount of resources from other sources. The WUA has also been successful in mobilizing considerable amount of labor for the construction and maintenance of field channels. . Exact figures of labor mobilization were not available. ISF is collected in cash. Some data related to cash generation from other means, inclusive from ISF, are presented in Table A 5.8 below:

Table A 5.8 Different Sources of Income of Marchwar WUA (NRs.)

S. N.	Income Sources \ Fiscal Year	1994/95	1995/96	1996/97	1997/98*
1	Farmers' contribution from allowances	68,060.00	18,200.00	5,784.50	-
2	Membership fees	565.00	6,601.50	4,500.00	6,000.00
3	ISF collection	-	58,286.75	72,657.15	115,377.50
4	Adult education program	18,836.25	15,800.00	-	-
5	Contract of fish pond	-	-	1,500.00	400.00
6	Community Forestry, nursery and dealership	-	-	6,658.50	109,852.50
7	Commission from construction works	-	-	19,693.2	57,173.50
8	Renting out the tractor	-	-	-	12,071.00
9	Fine	-	-	-	100.00
10	Miscellaneous	-	5,105.00	14,966.00	300.00
Total		**87,461.25**	**103,993.25**	**125,759.35**	**301,274.50**

Source: WUA records

* The figures of 1997/98 are of up to end of Chaitra (mid April) only.

From the above table, it can be seen that the shares of ISF in total income have been about 77% in 1995/96 and 41% in 1996/97. However, it is also seen that the WUA has diversified sources of income.

3.5 Relation between ISF and Water Adequacy and Reliability

No relationship was observed between ISF and water adequacy or reliability. Whoever irrigates his farm has to pay ISF irrespective of adequacy or reliability of irrigation supplies. The ISF is based on the maximum irrigable area in a year for whatever crop grown. . Usually it is rice.

3.6 Farmers' Willingness to Pay

In general, farmers were willing to pay ISF. No other options are given except to pay in cash. However, an analysis of rates of collection indicates that the WUA has not been able to collect all the assessments. As informed by the chairman of the WUA , it is costly to collect ISF, since it is too small an amount for a paid employee of the WUA to personally collect from individuals. . Payment of ISF directly to the WUA office has not been popular so far.

Because of the difficulties encountered in collecting ISF, the WUA is exploring other means for mobilizing required resources. . The declining trend in ISF collection efficiency substantiates the assertion.

3.7 ISF Collection Mechanism

At present only the 'Main Committee' is engaged in ISF collection. . The WUA, with the help of its Secretary and temporarily hired staff, are involved in this effort. . ISF collectors (paid by WUA) usually go door to door to collect the assessed ISF

3.8 Means for Controlling Free Riders

The control of free riders, is accomplished by field verifications made during the crop season by block level committee members , when requested by the main committee. As the irrigation system runs on the principle of proportional water distribution, it is difficult to cut off water supplies to a particular block, because the structures cannot be fully regulated. Another method used to control free riders is to exert some social pressure on the non-payers.

3.9 Utilization of Collected Fees

Although the amounts collected by the WUA and WUG funds are meant to be used for the operation and maintenance of the respective canal system, some ambiguity exists in this regard. There are no clear rules and regulations with respect to the proper utilization of the mobilized resources. Neither the WUA nor the groups at the lower levels prepare any plans for spending the collected resources on O&M activities. A typical expenditure statement is given below. No money has so far been spent on the maintenance of the canal.

Table A 5.9 Expenditure of Marchwar WUA (NRs.)

S.N.	Expenditure	1994/95	1995/96	1996/97	1997/98*
1	Salary of staff	-	-	-	98,513.00
2	Allowances for staff	-	-	-	1,504.96

3	Grant and rewards	-	-	-	6,300.00
4	Stationary	-	645.00	1,590.00	14,301.50
5	Miscellaneous (e.g. tea)	20.00	6,505.00	10,615.50	19,872.99
Total		**20.00**	**7,150.00**	**12,205.50**	**140,492.45**

Source: WUA records
* By the end of Chaitra (mid April) only.

3.10 Rules, Regulations, Role, and Authority

Some rules and regulations for ISF collection exist. For instance;

- "If any canal committee does not collect 70% ISF, the committee will be deprived of receiving maintenance money".
- "Those canal committees which collect more than 70% ISF will receive 25% of ISF collection for the maintenance of their respective canal".
- "When the canal committee secretary is fully involved in collecting ISF he will be supported by an incentive of 3% of the collected amount".

However, none of these rules have been implemented for the reason that the collected amount is so low that it is even difficult to support the existing staff.

3.11 Arrears and Dues

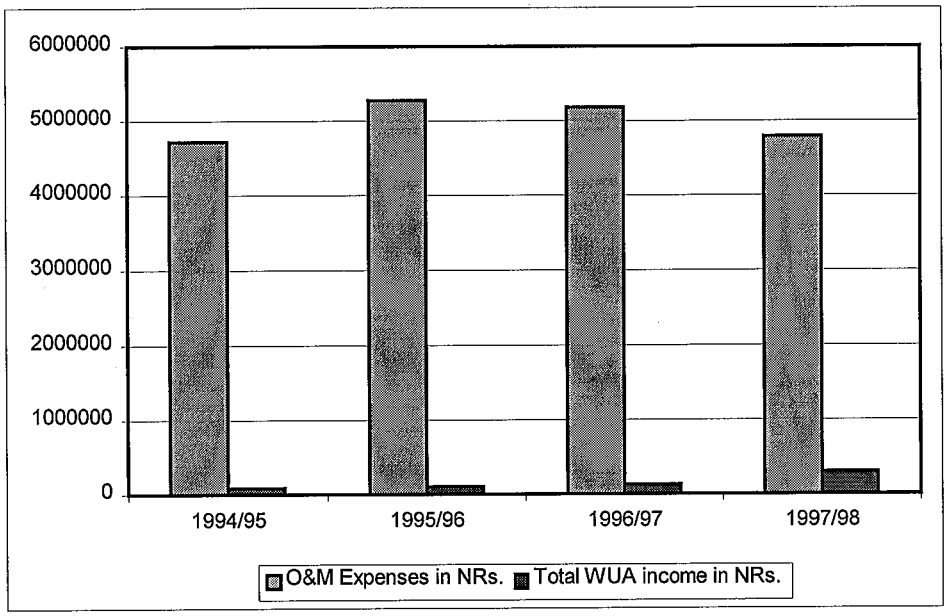
When farmers do not pay their ISF dues even up to the end of Jesth, 5% extra is added to the previous amount. However, this mechanism of imposing penalties has also been not very effective in improving the ISF collection rates.

There is no provision for writing off the arrears. All farmers within the command area have to pay ISF. Farmers who do not get water have to report to the WUA and it will make necessary arrangements to make water available to the subject.

4. Sufficiency

At the present level of income, from both ISF and other sources, the turn over of complete operation and maintenance responsibility to the WUA does not appear to be sustainable in the long term. The Marchwar WUA does not seem to have the experience as an organization to handle the complex O&M activities of the irrigation system nor does it seem to be mentally prepared for the task .As discussed above the WUA has only been able to collect about 7% of the total O&M expenses. A graphical presentation of the income and O&M expenses is made below:

O&M Expenses and WUA Income



Annex 6: Nepal West Gandak Canal Irrigation System

The Nepal West Gandak Canal Irrigation System, hereafter referred to as West Gandak, is located in Semari of Nawal Parasi district in the east of Parasi. The project area has Narayani (Gandak) river in the east and Indian border on the northwest. The area is linked with east-west highway at Bardaghaat by a 11-km graveled (now being paved) feeder road.

Background

The construction of the Tiveni Barrage began in 1964-65, following an Indo-Nepal Gandak Agreement concluded in 1960 The West Gandak Irrigation System, fed by the Barrage was completed in 1979 and handed over to His Majesty's Government of Nepal.

During the period 1982-1989, the Command Area Development Project was launched in the irrigation system under which numerous tertiaries, sub-tertiary canals, and farm ditches were constructed to serve areas up to 7 to 12 ha.

In 1992, a Joint Management Program was implemented. Accordingly, in November 1992, a sensitization meeting of farmer representatives, local leaders and representatives of line agencies was organized under the initiation of Irrigation Management and Water Utilization Division of DOI. In February 1993, a draft constitution for the beneficiaries' organization was prepared and in March, the first election of the executive members was held. Following it, on June 27, 1993, the WUA was registered at Chief District Officer's Office.

Later in 1994, the irrigation system was taken up under the Irrigation Management Transfer Project (IMTP). A Sub-Project Management Committee' was formed in November 1994, to carry out various activities of the IMTP, , in order to bring irrigation system up to the stage of full turn over in November 1997. Two distributaries namely Piparpati and Parsauni were turned over to beneficiary farmer organizations under the joint management program in 1993.

In April 1995, the second election of the WUA was held and in May, a separate office was established within the premises of West Gandak office. In August 1997, the WUA negotiated with the Ministry of Forestry and Soil Conservation to hand over the *Sisho*' plantation along the main canal service road, under the community forestry program. was. In April 1998 a revised constitution was enacted and based on this, the third election has begun for the different office bearers of the WUA.

1. Main Features

1.1 Physical

Headwork

Water is diverted from Narayani River to the canal system by means of a permanent type intake at Triveni Barrage, which is managed by the Indian Government., Water for the Piparpati and Parsauni distributaries is obtained through separate intakes provided along the Indian Main Canal. As the above are permanent structures O&M costs are minimal.

1.3 Agriculture

The average land holding per household in the command area is 1.37 ha. About 20% of the farmers are sharecroppers. Distribution of farm size is given in Table A 6.1 below:

Table A 6.1 Distribution of Landholdings in West Gandak Irrigation System

Size Class	Percentage of Farmers
> 2 ha	29
1 – 2 ha	26
< 1 ha	45

Fragmentation of land was also reported to be on the increase.

Cropping pattern

The command area has a typical cropping pattern of rice and wheat. The area cultivated in the winter season is more or less constant. Areas under mustard and pulses have been increasing over the last few years. Sugarcane cultivation is confined to certain locations where water availability is unreliable. The extent under sugarcane has remained constant. The trends of the cropping pattern in the area is presented in Table A 6.2 below:

Table A 6.2 Cropping Pattern (Hectares)

Year	M. Rice	Wheat	Sugarcane	Pulses	Oilseed
1993/94	7410	3432	1800	1400	600
1994/95	7623	3900	2200	1200	800
1995/96	7895	3405	2038	1832	1401
1996/97	7650	3891	2200	1250	600

Source:

Corresponding crop yields in t/ha are tabulated in Table A 6.3 below:

Table A 6.3 Yields in West Gandak Irrigation System (mt/ha)

Year	M. Rice	Wheat	Sugarcane	Pulses
1994/95	3.40	2.40	44.7	0.60
1995/96	3.72	1.54	32.0	0.45
1996/97	4.28	2.10	50.0	1.20

The prices of the commonly grown crops are given in table below:

Table A 6.4 Crop Prices in West Gandak Irrigation System (NRupees/1000Kg)**

Year	M. Rice	Wheat	Sugarcane	Pulses
1994/95	7400.00	6500.00	1900.00	21000.00

Agriculture Support Services

The Agricultural Development Bank (ADB) and Agricultural Inputs Corporation (AIC) are both situated in Parasi, which is quite close to the project area. However, the farmers reported that the availability of agricultural credit was unsatisfactory. . Similarly, farmers also expressed dissatisfaction with regard to the availability of improved seed s and fertilizers.

Several training programs have been organized for farmers in the irrigation system under joint management initiatives and IMTP. Other agencies like District Agricultural Development Office, etc. have also given training to the local farmers on various agricultural aspects.

Market

The project area is connected to the East-West Highway by a link road. The townships of Butwal and Narayanghaat are situated close to the scheme along the highway and are potential markets for produce from the project. The city of Parasi also offers good marketing facilities for different agricultural products. At present, farmers do not face problems in marketing their produce.

2. ISF Related Terminology

Some of the ISF related terms in use are briefly described below:

- '*Sinchai Sewa Shulk*' – Irrigation Service Fee.
- "*Share Sadasyata Shulk*"- Membership Fee based on share system.
- '*Bakyouta*'- Arrears (Amount of unpaid ISF from previous years).

3. Resource Mobilization for Financing O&M

3.1 Assessment of Resource Mobilization Requirements

The WUAs in the irrigation system have fairly good estimates of resources needed to operate and maintain the irrigation system based on the previous experiences of joint management. O&M expenditures over the last few years are given in table below. These figures pertain mostly to the West Gandak system. Piparpati and Parsauni distributaries were turned over to farmers about four years ago and since then farmers have been responsible for O&M costs in these two distributaries

Table A 6.5 O&M Expenditure in West Gandak Irrigation System (NRs.)

Fiscal Year	O&M Budget Expenditure
1993/94	2,366,732
1994/95	2,352,329
1995/96	971,806
1996/97	1,040,229

Source:

The West Gandak irrigation system was fully turned over to the beneficiary farmers last year (1997). A full assessment of the O&M expenses and the amount of resources to be mobilized have to be made. The DOI has agreed to provide NRs. 200,000 over the next three years, as a contribution toward O&M, during the transition phase.,

The WUA of Piparpati and Parsauni Distributaries, which took over management responsibilities of the respective canals about four years ago, have made very crude assessments of the resource mobilization requirements for O&M of their respective distributaries. Usually, farmers of these distributaries contribute labor to clean up the canal stretch every year. The WUAs of Piparpati and Parsauni do not have proper records of the mobilized labor.

3.2 Assessment of Delivered Irrigation Service

The delivered irrigation service is assessed in terms of the irrigated areas per crop for maximum of two main crops. The ISF is charged on seasonal basis in some areas and on yearly basis in others considering two seasons: monsoon and winter. The rate of ISF is NRs. 60/ha/crop for West Gandak area and NRs. 225/ha/year for Piparpati and Parsauni distributaries. No difference is made between different uses of water or irrigation applications for different crops.

Some assessment and collection figures inclusive of Piparpati and Parsauni areas are given in Table below:

Table A 6.6 ISF Assessments and Collections in West Gandak Irrigation System (NRs.)

Fiscal Year	Assessed ISF	Collected ISF	Collection Efficiency in %
1993/94	-	48,681	-
1994/95	-	98,796	-
1995/96	297,440	111,164	3.73
1996/97	217,984	177,587	8.15
1997/98 till mid May	577,050	242,467	42.02

Source:

3.3 Relation between Resource Mobilization and Irrigation Service

In the absence of exact figures of labor mobilization , especially in Piparpati and Parsauni areas, it may be misleading to draw any relationship between resource mobilization and irrigation service. The data on cropped area seem to suggest that there has not been any major improvement in irrigation service. The ISF assessment figures also do not show any definite trends. However, it can be clearly seen from the above table that ISF collection efficiency is on the rise.

3.4 Forms of Resource Mobilization

In general, two forms of resource mobilization practices were observed : Labor and Cash. Labor is generally mobilized for desilting the canals. Cash is raised from the distribution of share membership (equivalent to NRs. 30 per ha), ISF collection @ NRs. 60/ha/crop of irrigated area in the West Gandak area and NRs. 225 in Piparpati and Parsauni area. Other cash income sources include , toll from vehicles that operate on the canal service road, rental from shops and huts in the canal area , toll from weekly markets (Haat) on the canal service roads, penalties and fines, equipment rentals, charges from pump operators that use canal water, and sale of "sisho" bushes along the main canal. In fact, "sisho' trees bring in a large revenue of about NRs 1,000,000 per annum (200,000 trees @ NRs. 5 per tree). Thus, we see that the WUA has many diversified sources of income.

3.5 Relation between ISF and Water adequacy and Reliability

Despite rising trend of ISF collection efficiency, no conclusive relationship can be drawn in terms of its relationship with water adequacy and reliability. One would usually expect better collections with improved irrigation service in terms of water reliability and adequacy.

3.6 Farmers' Willingness to Pay

In general, farmers are willing to pay ISF provided they have received the irrigation service. ISF must be paid in cash, no other options are given to farmers.

3.7 ISF Collection Mechanism

The ISF is collected at the toli level. Members of Toli collect ISF from the farmers' residences,but the records are kept in the Area-office. 20% of the amount collected from each branch is given to the Main Committee. At present, the officials attached to the water delivery task force, who are paid employees of the WUA, also assist in ISF collection efforts.

3.8 Means for Controlling Free Riders

Though there is provision for shutting down water supply to the entire canal stretch in case of non-payment of ISF, it has proved to be difficult in practice. Usually, "bugging" is the way to make people pay ISF and stop free riding. No effective mechanisms for controlling free riders were being adopted.

3.9 Utilization of Collected Fees

The resources collected in the toli funds are expected to be used in the operation and maintenance of the respective canal system but in practice this did not happen..There were no plans drawn up at the toli level for carrying out O&M works in their respective stretches of the canal. However, the main committee does prepare an O&M plan and budgets for it. So far, the planned activities for ISF funds have never been completed. Instead, such work is usually done using resources collected by other means.

3.10 Rules, Regulations, Role, and Authority

The rules and regulations within the system are governed by the constitution of WUAs. . The WUA has developed its own rules and regulations, for collecting ISF. For instance, the rate of ISF has been fixed at NRs. 60/ha/crop for West Gandak and NRs. 225/ha/year for Piparpati and Parsauni areas. If any farmer within the command area does not get water he/she is allowed to pump water from the canal. In this case they have to pay only half of the amount due for ISF. The WUA has full authority to formulate and implement such rules as long as it does not violate the legally recognized constitution.

3.11 Arrears and Dues

When farmers do not pay their ISF dues even up to the end of Kartik for monsoon crops and by the end of Baisakh for the winter season crops, the amount is recorded as arrears. Such arrears can be waived if the respective toli verifies in the field that the particular area either did not get water or that it was not possible to irrigate even by pumping from the canal, during the actual crop season.

4. Sufficiency

As seen form the above discussions, the West Gandak is quite capable of generating the needed resources to meet the O&M costs in different ways. However, the ISF collection rates indicate that the WUA has to depend more on the alternative income sources compared to collections from ISF.

Annex 7: Pithuwa Irrigation System

The Pithuwa irrigation system is located in the Pithuwa village, 16 km east of Bharatpur and about 2 km north of Tandi bazaar in Chitwan district. The command area is connected to Tandi bazaar market on the east-west highway, by an all-weather gravel road.

Background

The construction of Pithuwa irrigation system was initiated in 1967 under Minor Irrigation Scheme of HMG/N. The construction started in 1968 and was completed in 1973 at a total cost of NRs. 2,00,000. In 1974, a torrential flood washed away certain sections of the main canal. As O&M of this system was the responsibility of the Khageri Irrigation Subdivision Office, the government irrigation agency released NRs. 8,00,000 for river protection and flood repair work and for improving the system as well.

Subsequently, up to 1979, O&M responsibilities were with the Chitwan Irrigation Project and finally with the District Irrigation Office of Chitwan. In 1979, the government office staff were withdrawn and the O&M responsibility was transferred to the users. At the time of transfer, the irrigation agency and the water users signed an agreement under which, the users would supply the required labor and the agency would finance the cost of labor at the prevailing wage rates. In 1980, it was also agreed that the beneficiaries' organization would be given a government owned bulldozer for three months to attend to problems arising from the temporary headwork in the rainy season. The Committee also received the maintenance fund allocated by the government.

In 1996 –7, the irrigation system received rehabilitation assistance from the East Rapti Project under Department of Irrigation. However, the support was limited to structural strengthening of the irrigation system, except the headwork. The condition of the headwork remains the same.

1. Main Features

1.1 Physical

Headwork

The Pithuwa Irrigation system is a run-of-the-river system and captures water from the Khair Khola. The source is perennial but the discharge is very low during the dry season. The river originates from Mahabharat range of hills and has large variations in seasonal flows. There is no permanent diversion structure. Water is diverted by a temporary dam made of stones and boulders, which gets washed away during the monsoon floods. The structure has therefore to be redone every season. . The O&M costs of the temporary headwork in this irrigation system is very high because it has to be reconstructed on a regular basis.

Further, continued degradation of upstream catchment due to deforestation, etc. have caused high flood frequency, increased silt load, and reduced dry season discharge at the intake.

Canals

The earthen approach canal of the irrigation system is 75m long with 16 branch canals. The main canal is 7.5 km long with a design discharge of 1.4 cubic meters per second. The canals have already reached a

regime condition, hence require only nominal maintenance. However, silt deposition in the canals, especially during monsoon season, is high. Therefore a considerable amount of labor has to be mobilized to clean the canals every season.

Command Area

The command area of the scheme is 618 hectares. There are 600 households residing in the Pithuwa, Madhavpur, and Khairate villages, covered by the scheme. The topography of the command area is flat and gently sloping from north to south. Soils are of fine loamy to loamy texture and well drained.

Major Structures

There are very few permanent type water control or regulatory structures along the canal network. No pucca water distribution structures have been built in the branch canals. Even the concrete pipe outlets along the branch canals have no reliable gates and are usually regulated with the help of mud, stones, or wooden planks.

Water Adequacy

Although the main canal was originally designed for 1.4 m^3/sflow, the capacity has been greatly reduced because of continued silting of the canal. Usually, acute water shortage is observed during the dry season. The available water is also used for drinking. Water shortages occur during e transplanting of rice when rainfall is insufficient. Farmers adopt a rotational schedule to cope with the shortages and share the shortage equally among them. *Water Reliability and Equity*

Whatever amount of water available , the farmers share it equally and maintain reliability, although the quantity may not be adequate. However, reliability of water supply declines during the monsoon season when there are floods in the Khair Khola.

Equity in water distribution is maintained as water is distributed in proportion to an individual's landholding in the irrigated area.

Constraints

The major constraint faced by the irrigation system is the temporary nature of the headwork, which is often washed away by floods. Further, the silt intrusion into the canal network also causes problems of reduced flow in the canals and thus a reduction in the amount available for irrigation, although there is sufficient water at the source.. This is also causes the unwanted deposition of coarse sand in cultivable land, especially in the head reaches.

1.2 Socioeconomic

Ethnicity

The command area has mixed ethnic groups of Brahmin, Chhetri, Magar, Gurung, Tamang, Newar, Tharu and Kumal. Most of them have migrated into the area earlier on, from different parts of the country, especially from the hilly districts. Despite the caste differences within the population in the area, there is a high level of mutual cooperation among farmers in cultivation activities.
Migration

Until late 1960s, the area was thinly populated. However, with continued migration into the area, per capita land and other resources declined. From the 1970s, immigration started to decline as there was not much left for the new settlers. At present, the inflow has stopped, and there is no permanent migration out of the area as well. However, temporary and seasonal migration of the residents is common and is mainly for better employment in bigger cities.

Income sources

The primary income source of the local residents is agriculture and therefore dependency on agriculture is high. The area offers very limited alternative income opportunities.

Water Users Association

A two-tiered Water Users' Association was formed in 1975 when farmers took over the system's management responsibility and initiated a remodeling and extension of the physical system. In 1977, the WUA collected land data and rectified the outlet sizes for uniform water distribution.

In 1985, the tenure of the WUA was increased from one year to two years and in 1991, the organization gained legal status by registering itself with the Chitwan Chief District Officer's office.

The main committee has a chairman, a vice-chairman, a general secretary and 7 members. Similarly, Branch Committees also have chairmen, secretaries and 3-5 area members depending on the size of area covered by the outlet of the branch canals The executive members are selected or elected, depending on whether farmers have consensus or not.

The checks and balances in the beneficiaries' organization are maintained through supervision by the General Assembly of all the farmers and a well-formulated constitution with strong enforcement of the rules and regulations. All organization levels, including, the general assembly, are inter-linked by means of clearly defined rules and regulations.

The General Assembly meets once a year on the date decided by the Chairperson of the Main Canal Committee. At the General Assembly, annual maintenance plans and the budget requirements for the following year are formulated, new officials are elected/selected, and operating rules are reviewed, modified or amended.

The Main Canal Committee is responsible for the operation and maintenance of the main canal. It also acts as the coordinating body for Branch Canal Committees. The Chairperson of the Main Canal Committee is responsible for organizing, supervising, and coordinating various management activities of the system. The Secretary keeps records of water allocation to different branch canals, attendance at the work assignments, and minutes of meetings of the Main Canal Committee. The operation and maintenance of the branch canal is the responsibility of each of the sixteen branch level committees.

Recently, the WUA has become a member of the federation of WUAs located in the East Rapti river basin.

1.3 Agriculture

Land tenure

The average size of landholding is 0.56 ha per household. Fragmentation of land was reported to be increasing. Majority of the land is owner-operated. There are no land-less families. However, about 12%

of the farmers are tenants in the tail reach, where absentee landlords own major portions of lands. These tenants cultivate mostly under rain-fed conditions as they do not have reliable access to canal water.

Informal share cropping (*adhiya*) is the general pattern of tenancy. Under this system, the cost of chemical fertilizer, pesticides, etc. and output are shared equally between the landowner and the tenant. In some instances, the proportion of the share of the harvest that the tenant has to pay to the landowner is fixed in advance.

Cropping pattern

The cropping intensity in the irrigated area is about 270%. Most farmers grow three crops a year. Maize, paddy and oilseeds are the principal crops. Traditional varieties of maize were dominant until the late 70s. Presently improved varieties are cultivated and the coverage is about 94%. The typical cropping pattern in the scheme is presented Table A 7.1 below:

Table A 7.1 Typical Cropping Pattern in Pithuwa Irrigation Scheme (ha)

Year	Maize	Rice	Oilseed	Wheat	Lintel
1993/94	580	525	430	65	50

Till the early 1970s, only *Ghaiya*, a long-term local variety of rice was grown in a limited area under rain-fed conditions. Presently, monsoon rice is very common and is grown on about 85% of the extent under the command.

Oilseed , that was cultivated during winter season only, is now cultivated immediately after the harvest of rice.

Wheat was introduced during the late 1970s and area under wheat has increased slowly. (presently about 11% of the total extent).

Spring rice is not grown at all, because of insufficient water during the pre-monsoon season. Although cultivation of spring rice would be possible if restricted to certain areas only, the WUA has banned it as water requirement would be high and cultivation would result in a disproportionate distribution of water.

Agriculture support services

The availability of agricultural credit was reported to be satisfactory. The Agricultural Development Bank (ADB) and Agricultural Inputs Corporation (AIC) are situated at Bharatpur. In addition, local traders assist the farmers to obtain the required inputs.

Market

A good road network linked to the East-West Highway has provided the farmers with ready access to the market. Other major markets located close to the scheme are Narayanghat, Bharatpur and Tandi Bazaar. These towns have grain and food processing industries, agricultural input marketing businesses and numerous private grain traders.

2. ISF Related Terminology

No special terminology related to ISF was being used in Pithuwa Irrigation System.

3. Resource Mobilization for Financing O&M

3.1 Assessment of Resource Mobilization Requirements

, The main canal and outlets need repair once a year in the Pithuwa irrigation system whereas the diversion weir in the Khair Khola needs repair more frequently. To address the problem of the headwork, the main canal committee has set aside a certain amount of money to pay for the fuel for the bulldozer. The farmers desilt the main and branch canals by mobilizing labor from the entire command area. Additional cash requirements, apart from funds allocated by the government, or labor needed are obtained from the farmers in proportion to the size of their landholdings.

The amount of labor mobilized is quite high in this scheme . For instance, the amount of labor mobilized in 1986 was equivalent to 1,200 man-days, i.e. about two man-days per household or per hectare of land. This was in addition to the funds allocated by the government (Prasad, 1994).

However, the uncertainty of O&M requirements and the amount of funds to be collected has made it difficult to predict and plan for future programs.

3.2 Assessment of Delivered Irrigation Service

Water distribution schedules are based on the area to be irrigated in different sectors of the command area. In general, the farmers follow rotational schedules based on branch canals. Each branch canal gets water for a specified period of time based on the proportion of the area commanded by the particular branch canal. The distribution of water within the the branch canal, by means of field channels, is also based on the same principle.

Water distribution schedules are closely monitored at both the main and branch canal levels by the respective user committees. This helps the committees to get a feedback on the quantum of delivered irrigation service to different areas of the irrigated command area.

No distinction is made between different uses of water and irrigation of different crops.

3.3 Relation between Resource Mobilization and Irrigation Service

The resource contribution in the Pithuwa Irrigation System, either in cash or as labor, is y based on the proportion of irrigated land owned by a farmer within the command area. The first priority is to mobilize labor, as this is what is most needed for maintenance work. The irrigation service provided is measured by the land area that has received irrigation. The land owning individual has to contribute resources for O&M in proportion to land owned in the system.

3.4 Forms of Resource Mobilization

In general, the required resources for O&M are raised in two ways. Firstly, labor is mobilized in proportion to the share of water which is based on land area and secondly, through cash fines collected from those who do not contribute their share of labor. However, cash deals are minimized as far as possible.

3.5 Relation between ISF and Water adequacy and Reliability

Since water is distributed in proportion to the land area, water adequacy or inadequacy is the same for everybody. Whatever the water distribution schedule, once decided, it is implemented very strictly. So, the reliability of water supply is very much assured unless there is water scarcity at the source itself. Even in such cases, when the quantity of water gets unexpectedly reduced, , the respective committees adjust the previously prepared schedules to take into account such reduction. .

3.6 Farmers' Willingness to Pay

The Majority of farmers are willing to pay or contribute the apportioned resources for the O&M of the system.

3.7 ISF Collection Mechanism

The mobilization of the targeted amount of resources from the beneficiary farmers is the responsibility of the respective branch committees. They keep records of each farmer within the command of the branch canal.

3.8 Means for Controlling Free Riders

Conflicts relating to water use and resource contributions are resolved at both the main and branch canal levels of the organization. Issues related to a branch canals are handled through the Branch Canal Committees whereas the Main Canal Committee handles those of the main canal. The General Secretary has set a system of penalties for the violators. The amount of penalty depends on the severity of the violation. The defaulter has to contribute a minimum of one man-day of labor or the equivalent amount of money. Enforcement is undertaken by withholding the defaulter's share of water by the relevant committee.. In case of non-compliance of either the water distribution or resource contribution rules by a Branch Canal Committee, the entire branch canal could be denied water.

3.9 Utilization of Collected Fees

All the resources generated from the beneficiary farmers of the irrigation system are utilized for O&M activities of the system.

3.10 Rules, Regulations, Role, and Authority

The constitution and supporting rules and regulations of Pithuwa Irrigation system are applied to all activities within the system. The WUA has full authority to set rules and enforce them so far as they are agreed upon in the general assembly and conform to the lawfully recognized WUA's constitution.

3.11 Arrears and Dues

No arrears are allowed for resources to be contributed by individual farmers. Those with arrears are immediately subject to sanctions as described above.

4. Sufficiency

The process of resource mobilization for financing the O&M requirements of the system has been sustained and will be sustainable as long as the maintenance requirement at the diversion is within their capacity.

Annex 8: List of Participants in ISF Working Team Discussion

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Farmers' Representatives

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33. Mr. H. P. Bhetwal, Chairman, Kankai IS
34. Mr. K. Neupane, Chairman, Chhattis Mauja IS
35. Mr. R. P. Sah, Chairman, Bangeri IS
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41. Mr. C. D. Bhatta, Advisor, National Planning Commission
42. Mr. M. P. Sharma, Consultant, IMTP
43. Mr. N. Ansari, SISP TA Team
44. Mr. S. S. Ranjitkar, World Bank, Yak and Yeti Complex, Kathmandu
45. Mr. R. R. S. Neupane, CADI/IMTP
46. Mr. U. R. Timilsina, DOI
47. Dr. R. Laitos, CADI/IMTP

Annex 10: ISF Workshop Schedule

Workshop on Irrigation Service Fees in Nepal

Date: July 30, Thursday (Shrawan 14, 2055)
Venue: Hotel Bluestar, Thapathali
Program:

Activity	Time	
	From	To
Registration	9:00	9:15
Opening Session: 9:00 – 10:00 Chairperson: Mr. Director General, Department of Irrigation Reporters: K. C. Prasad and Suman Sijapati		
Welcome address by the workshop coordinator Dr. K. R. Sharma and suggestions of ISF working team meeting	9:15	9:30
Taking the Chair by the Chief Guest, the Secretary, MOWR		
Taking the Chair by the Chairperson, the Director General, DOI		
Inaugural speech by the Chief Guest	9:30	9:40
Views on relevance of the Workshop by the Chairperson	9:40	9:50
Self introduction by the participants	9:50	10:00
Tea Break: 10:00 – 10:15		
Presentation Session: 10:15 – 12:00 Chairperson: Mr. R. L. Kayastha, Joint Secretary, MOWR Reporters: Suman Sijapati and K. C. Prasad		
Presentation 1 – ISF Collection Trend in Nepal: A Review – Dr. Pradhan	10:15	10:30
Presentation 2 – Mechanism for Generating Resources in FMIS for O&M in Nepal – Dr. Pradhan	10:30	10:45
Presentation 3 - Position paper on Legal aspects of ISF in Nepal – Suman Sijapati	10:45	11:05
Presentation 4 – Cases Review – KC Prasad	11:05	11:20
Presentation 5 – ISF: A Pragmatic Approach – P. N. Singh	11:20	11:30
Summing up by Chairperson	11:30	11:45
Group formation	11:45	12:00
Lunch: 12:00 – 13:00		
Group Discussion and Feedback Session: 13:00 – 15:35 Chairperson: Mr. S. N. Poudel, MOWR Reporters: Suman Sijapati and K. C. Prasad		
Group Discussions	13:00	14:20
Group Presentations (Three groups)	14:20	14:50
Open discussion	14:50	15:25
Summing up by the Chairperson	15:25	15:35
Tea Break: 15:35 – 15:50		
Closing Session: 15:50 – 17:00 Chairperson: Mr. Y. L. Vaidya, MOWR Reporters: Dr. K. R. Sharma and K. C. Prasad		
Views by Dr. P. Pradhan	15:50	16:00
Views by Mr. C. D. Bhatta	16:00	16:10
Views by Mr. M. M. Shrestha	16:10	16:20
Views by Mr. C. M. Tater	16:20	16:30
Views by one of the farmer representatives	16:30	16:40
Remarks by the Chairperson	16:40	16:50
Vote of thanks by Mr. R. P. Satyal	16:50	17:00
Workshop adjournment	17:00	

Annex 13: Income and Expenditure Statement of 1996/97 of Khageri WUA

Income				Expenditure			
No.	Description	Estimated	Actual	No	Description	Estimated	Actual
1	Deposit of previous year	322,409		1	Salary	35,000	26,300
2	Deposit in AIC	15,000		2	Allowances	5,000	
3	ISF for monsoon	120,000		3	Stationary	7,000	1,271
4	ISF for winter	15,000	13,928	4	Furniture	10,000	5,171
5	Membership fee	5,000	2,615	5	Justice Fee	10,000	8,538
6	Subsidy and contribution	2,000	707	6	Subsidy	5,000	5,000
7	Fines		1,500	7	Contingency	10,000	
8	Interest	2,000		8	Maintenance	2,000	41,435
9	Fish Contract	20,000		9	Miscellaneous	16,000	10,768
10	Proceeds from Fertilizer	10,000	19,515		Branch 6 West		9,900
11	sale	19,420	10,000				
	Miscellaneous		6,153				
	Sale of Rice						
12	Others	5,580					
13	HMG contribution	5,000	5,580				
	Share from each branch		119				
	canal for MC		50,939				
	Cleaning						
			17,800				
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			128,860				119,825
			322,409				331,444
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			451,269				451,269

Source: Budget submitted to 9th General Assembly meeting of Khageri WUA on Dec 20 1997, Saturday, Shiva Nagar, Chitwan.