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FARMER MANAGED IRRIGATION SYSTEMS IN NEPA

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FARMER-MANAGED IRRIGATION SYSTEMS IN NEPAL.

Prachanda Pradhan.

I. INTRODUCTION.

Nepalese farmers have recognized the importance of water resources for centuries and have been constructing irrigation systems at their own initiative to intensify their agriculture production. Irrigation development in the country remained in the hands of the people for many years. This tradition gave birth to the farmer-managed irrigation systems (FMIS) scattered all over the country. Historically, irrigation development has fallen under the domain of either a religious trust, individual initiatives or community effort. The legal tradition and local administrative structures over period of time have permitted farmer managed irrigation systems to operate without interference from an irrigation agency or other administrative units. However, they have been assisted by the government from time to time when natural calamities required resources beyond the capacity of the farmers.

Irrigation systems can broadly be categorized into two groups according to where the responsibility for their management lies: those that are agency managed and farmer managed systems. In the farmer-managed systems, farmers are responsible for all activities encompassing water acquisition from the source to delivery to the plant in the field.

70 percent of total irrigable area in Nepal is presently under farmer management. It is estimated that there are about 1700 farmer managed irrigation units in the Tarai and over 20000 in the hills of Nepal. All these systems are managed by the farmers themselves. FMIS are not necessarily small systems. They include command areas ranging from less than 10 ha to 15000 ha. There are many FMIS systems ranging from 3000 to 5000 ha. in Nepal. Despite the pressure of changes in the environment, landslides ,and deforestation, many systems have made incremental improvements and only a few have fallen into disuse.¹

Farmers have developed their own irrigation systems taking account of geographical impediments and limited services from the government in the past. They have managed their systems by adjusting the operation to the soils, climate , topography and social structure of the particular location over a period of many years. These environmental conditions, which vary tremendously throughout Nepal, have contributed to different pattern of irrigation organization. In addition to distinctively different organizational patterns for the well defined tasks of water acquisition, allocation, and distribution, methods of system operation and maintenance , and organizational activities regarding conflict management, communication, resource mobilization and decision making vary.

It is proposed to present the examples of FMIS in the following sections. These examples represent both large and small systems. Irrigation water resource is being managed by the beneficiaries on the basis of the collective decisions. The organization of the beneficiary farmers is motivated

by different factors of the environment. However, the farmers have demonstrated the capacity to make those resources even under very difficult situations. Appropriate norms and values were developed by those farmers over period of time. They have managed and maintained the systems and used for productive purpose.

II. EXAMPLES OF FMIS IN NEPAL:

The example systems given in the following section have gone through different stages of organizational transformations influenced by the change in the physical condition, accessibility, social and political changes. One of the example systems has transformed its management from agency to farmer managed mode. Other system has changed from family ownership to community management. The farmer managed systems have adjusted and attempted to match with changed environment. Hence, these examples focus more on the organizational transformation and capacity development of the farmers to manage the common resource " Water " for agriculture.

1. Chattis Mauja Irrigation System.
2. Bhanu Bahara Irrigation System.
3. Satrasaya Phant Irrigation System.
4. Pithuwa Irrigation System.
5. Karnali Irrigation Systems.

1. CHHATIS MAUJA IRRIGATION SYSTEM. ²

This irrigation system, one of the larger farmer managed systems with 3000 ha command area, extends to 6 village and Nagar Panchayats with a population of about 25,000 in Rupendehi District. This system is over 100 years old. It operates through a tier organizational structure and specific job descriptions are given to each tier - a Village Committee in each Mauja and Regional Committees, each covering 6 village committees and one Central Committee. The written regulations to administer the system were approved by a general assembly of the water users and were put into effect in 1979.

Water Users Group

The land holders or operators within the defined service area of the irrigation system are the members of the water users group. The landholder or the operator has to furnish the committee with a record of the share of water entitled to him and the local committee registers his or her land area and entitlement of the share of water. He or she then becomes the member of the water users group, and of the collective decision making process for the management of the system and is made responsible for the maintenance of the

system in proportion to the land he or she holds.

The responsibilities of the members of the water users group are :

- (1) to provide labor in proportion to his land for the maintenance of the main canal and village canal;
- (2) to attend the meetings of the water users group at the village level as well as at the central level;
- (3) to approve, disapprove, or amend the regulations in the annual meetings;
- (4) to elect the officials of the water users committee;
- (5) to pay the fine for not complying with the rules of the committee if he breaks a rule.
- (6) to get grievances redressed either through the village level committee or the central level committee.

Village level Committee

Village level committees are connected to the higher levels of the irrigation management organization and responsible for making irrigation system functional, consisting of two to five members. The old villages usually have only two members, whereas in new villages there are up to five members on the committee.

In the new village, the Chief of the Committee is called the Chairman and in the old villages the chief is called Muktiyar. The Muktiyar or Chairman is elected annually by the water users of each village. Other members also are selected by the water users. Often times the same person will be reelected chairman or Muktiyar and Chaukidar unless the water users feel strongly against the incumbent functionaries.

In many village committees, the chairman or Muktiyar and the Chaukidar are remunerated by the villagers either in cash or kind. The range of remuneration is between Rs 500 and Rs 1000 annually.

Regional Committee

The regional committee is the link between the central committee and the village committees. The regional committee is composed of the Chairmen or Muktiyars of six maujas. From among these members, one will be elected as the Chairman of the regional committee. There are altogether nine Regional Committees in the Chhatis Mauja Irrigation System. The chairmen of these nine committees are the ex-officio members of the central committee.

Central Committee

The Central Committee is the most powerful body in the management of Chhatis Mauja Irrigation System. Previously, the decisions regarding the activities to be undertaken for the management of the irrigation system were made by the central committee meeting. In 1979 the central committee framed written rules and regulations which were approved by the general body of water users.

The central committee is composed of a chairman, vice Chairman, nine regional members and a committee-appointed secretary, two Meth Muktiyars and two messengers. The functions and responsibilities of these officials are spelled out in the irrigation regulation of Chhatis Mauja.

Water Distribution System

The whole irrigation system including its maintenance is aimed at providing water to the entire command area for paddy cultivation.

Each village canal has a direct inlet connected to the main canal. As far as possible, the system has avoided the sharing of water among the villages through the same canal. The main canal and most of the village canals are mud structures. Only a few village inlets have permanent structures which have been made through the contributions of concerned villages.

The inlet size is fixed by the central committee on the basis of the land to be irrigated within the village. Two wooden poles are placed at the entry point of the inlet to fix the size of the hole. Frequent inspection is made to check whether the hole of the inlet has been tampered with. The central committee can punish in accordance to the gravity of the tampering done by the village.

When there is enough water in the main canal, water distribution is easy. However, rigorous rules and regulations have been framed, keeping in mind the problems of water distribution management when there is a scarcity of water. Elaborate procedure of water distribution for different occasions has been developed and followed by the water users.

Maintenance of the System

The village level canals are the responsibility of the village level committee. As far as the main canal is concerned, it is the responsibility of the central committee to plan, to prepare the schedule, to mobilize human and material resources and to specify the types of work to be done. The village committee then complies with these plans.

In April, the annual meeting of the general assembly is convened. Thousands of people participate in the meeting. The meeting is held in a central location within the command area, often in one of the local high

schools. Those members who are absent from the meeting have to pay a fine. The annual progress report, work schedule for maintenance and desilting, and financial accounts are presented by the secretary to the general meeting. Progress is reviewed, new proposals are discussed. (For example, who is to get the water first, from tail end or head end) Accounts are settled and the date for maintenance and desilting is fixed. In the same meeting, the election for the chairman and vice-chairman are also be discussed. If the assembly feels that the incumbent chairman and vice-chairman should continue for the next term as well it is decided so. If they feel otherwise the date for the election is fixed.

The desilting activity in the main canal is considered the most important event of irrigation management. Now, this activity takes place during winter season.

Each village is assigned the amount of work to be done. Such work is assigned within easy reach of each village so that they do not have to walk far and do not have to work in other villagers' water inlet areas. However, the construction of the diversions in the Tinau river is the responsibility of all the villages. In an average, 60,000 people would be mobilized for the maintenance of the system in a year.

2. BHANU BHARAH IRRIGATION SYSTEM ³

The local people associate Bhanu Bharah with Bhanu Bhakta Acharya, a classical Nepalese poet, for his contribution to constructing the irrigation canal that feeds the plains of Chundi River valley in Tanahau District. Over time, the Bhanu Bharah area under irrigation expanded. Currently, the command area is estimated to be about 120 ha.

Until 1961, the system was managed by the family of Bhanu Bhakta. In 1961, rules and regulations were codified. The preamble of the regulation book mentions that for over four generations, the Bhanu family have looked after the system, but that the time had come for all farmers in the system to participate in managing the system.

A committee of seven members elected from among the farmers of the system was formed in 1961. These members have terms of one year which are subject to renewal based on job performance. The committee consists of a chairman, a vice-chairman, a secretary, a treasurer, and three other members. They meet once every fortnight.

There are currently 92 farmers in the system. Thirty years ago, only 12 farmers were members of the system. The irrigation command area is divided into five regions. Five of the committee members are responsible for communicating with the farmer in each region, each member represents one region.

The written regulations of Bhanu Bharah irrigation system mention the work division of the members, facilities for the committee members, resource

mobilization, water distribution in normal times, water distribution during stress times, and punishment and fines.

The Bhanu Bharah irrigation organization seems to have effectively made the transition from a family-managed system to farmer-managed system. Bhanu Bharah is quite effective in implementing the decisions reached during the general farmer's meetings. Since Bhanu Bharah has only one source of water to irrigate 120 ha, strict discipline is imposed and maintained for repair and maintenance. The brush dam and mud bunds have dictated that the organization be effective to compensate for structural deficiencies in the system.

Water Allocation and Distribution

During the paddy season, the water in the river is sufficient to supply a continuous flow of water throughout the system. The farmers make outlets on the main canal to get water, and during the monsoon season, farmers take water as they need it. Water is not allocated in proportion to cropped land.

However, if there is a shortage of water during the paddy season (or during the wheat and early paddy season), a rotation system is introduced throughout the system. The irrigation committee meets at these times and decides the rotation schedule. During times of water stress, each outlet has only a specified amount of water flow in proportion to the land to be irrigated. Therefore, the type of water allocation system depends on the availability of water.

Maintenance

Maintenance is divided into dam construction and main canal repair. The farmers have to contribute to both activities separately. Those who fail to participate are fined. The fine is fixed at 50 percent more than the current wage rate in the area. Committee members are exempt from contributing labor for their land up to 20 matomuri (0.25 ha). In addition to maintenance, labor is mobilized during crises (i.e. if a bund breaches or the brush dam washes out).

The main canal is cleaned at least once a year. The main canal is cleaned first, and then the farmers on the separate field channels clean those channels. The irrigation committee supervises the maintenance on the main system.

Each year, the canal is strengthened and enlarged to bring more area under irrigation. Bringing more area under irrigation means increasing labor mobilization for repair and maintenance. Landowners are not compensated for the land used to realign the canal.

Maintenance during the wheat or early paddy season is not considered a group activity. The farmers who grow crops during these seasons are responsible for system.

Conflict Management

When conflict arises during the alignment of the canal, the committee settles such issues with the landowner. To avoid conflict over water distribution during early paddy season, a rotation system is followed. While the committee is responsible for most conflict resolution, at the farm level the farmers settle water conflicts among themselves.

Conflicts in water distribution were reported to occur after, but are usually not serious. Such conflicts are generally started by downstream farmers who need water. Resolution was reported to occur through discussion among the parties involved; often with the help of that region's committee member.

3. SATRASAYA PHANT IRRIGATION SYSTEM.⁴

The local people believe that Satrasaya Phant is 200 years old and this is located in Tanahau District. Before the land survey in 1968, this area was known as Adhikari Phant. After the survey, the area was named Satrasaya Phant, because the land measurement came out to be 1699 mato muri (21.6 ha.). The local people added one more and made it 1700 (Satrasaya). The command area today is larger.

Until 1979, the irrigation system was looked after by a Jimawal. A Jimawal is a government agent who is responsible for collecting land revenue on behalf of the government. If the revenue collection falls short of the quota for the area, he must pay the revenue difference himself. Since irrigation contributes to productivity in the land, the Jimawal looks after irrigation as well.

After the Jimawal system was discontinued in Satrasaya Phant in 1979, a seven-member committee was formed to look after the irrigation system. Currently, they have a 10 member committee with a chairman, vice chairman, secretary, treasurer, and six other members. The secretary has been the same person since the committee was formed. The committee has written rules which are updated each year after discussion. There were 45 irrigators registered as members in 1979 and 1980. The same number is still continuing.

The tasks of the committee are to maintain the system and repair the dam annually, guard the dam during main crop cultivation (paddy), and allocate water to each farm within the command area. The irrigation organization is kept alive and active because Satrasaya Phant as a serious water rights conflict with Yampa Phant, another farmer-managed irrigation system, at the source of the spring.

Water Allocation and Distribution

Sharing the Aadi Mul Spring with Yampa Phant irrigation system has been an issue for generations. The Satrasaya Phant irrigation system attempts to

direct all of the spring's water into their main canal. When Satrasaya Phant farmers divert the spring water into their canal, the lower sections of Yampa Phant are deprived of water. Therefore, the farmers of Yampa Phant frequently break the Satrasaya Phant brush dam to feed water to the canals going to Yampa Phant. For this reason, protecting the dam in order to secure a steady flow of water is a prominent task of Satrasaya Phant's irrigation committee.

The committee assigns six different persons for each night to guard the dam.

After the irrigation committee took over water distribution from the Jimawal, the farmers found that they could not do the job satisfactorily as a group. The committee then contracted the responsibility for water allocation and distribution to a person called a water supervisor. The contract is reviewed each year, and the water supervisor's performance is evaluated.

During the summer paddy season, water is allocated along the main canal by the supervisor. The farmers have used the same allocation procedures for many years. Though there are no pucca outlets along the main canal, the size of the outlets is fixed according to tradition. When someone needs water, they give the water supervisor four to five days advance notice. The water supervisor allows water to flow into the first outlet until all the lands there are wet. He then rotates water from outlet to outlet from head to tail along the main canal until all the fields are wet. This procedure is repeated throughout the season.

When the rains are late or do not come during summer paddy season, the water supervisor divides Satrasaya Phant into four blocks and allocates water for 24 hours to each block. For his work, the water supervisor receives from each farmer 2. kg of paddy per ropani (0.05).

Maintenance

When the Jimawal managed Satrasaya Phant, 128 men were mobilized for main canal maintenance each day until the work was complete. The command area was divided into 4 blocks; 32 men from each block contributed their labor. Today, these blocks are the basis for the rotation system for water distribution during stress periods.

After the irrigation committee was formed, they locally contracted for the annual maintenance of the main canal. The lowest bidder for the job is given the contract for the year. In 1985, the contract amount for the maintenance work was Rs. 1000. The vice-chairman of the committee supervises the contractor. Dam repair is also done through a contractor.

Conflict Management

The major source of conflict for Satrasaya Phant farmers is the disagreement with Yampa Phant farmers over water rights on the Aadi Nul Spring. This is a perennial conflict and has never been satisfactorily resolved. Internal conflicts at the farm level are settled by the individuals involved.

4. PITHUWA IRRIGATION SYSTEM. 5

Prior to 1973, the lack of water within the current command area of Pithuwa located in Chitwan District, allowed farmers to grow only maize. In 1970, farmers were given Rs. 15,000 under the Minor Irrigation Development Program to construct an irrigation system in Pithuwa. Using voluntary labor and the fund the main canal was dug. However, the canal did not function properly and the people again approached the government. Finally, Department of Irrigation, Hydrology and Meteorology (DIHM) undertook the construction of Pithuwa Irrigation Project in 1973.

After DIHM completed the main canal, Irrigation water was released. At first, water distribution was laissez-faire. "Might is right" prevailed in the system resulting in conflicts and feuds over water share.

Then, one prominent farmer took the initiative to organize the farmers on Branch 14 into a committee, which formulated rules for water allocation and distribution along Branch 14. With farmer participation in committee activities, conflicts over water sharing along the branch canal decreased in a short time. Other branches started to follow the example set by the farmers of Branch 14. Eventually, all the branch farmers created branch committees for water allocation and distribution.

General Assembly

All the farmers in the Pithuwa irrigation system are members of the general assembly. The farmers meet once a year in June at a central location to discuss the following issues:

- a) general principles for managing water in the system
- b) electing the secretary of the main committee
- c) approving or disapproving the accounts of the system presented by the secretary
- d) reviewing whether the decisions made during the previous assembly meeting were duly undertaken or not.

Main Committee

The main committee has 18 members. Originally, the chairman was elected from among the assembly members. The Chairman and secretary of the main committee are elected by the assembly during the annually meeting. The other

sixteen members are the chairman of the branch committees.

From late June until late October the committee is active and holds at least one meeting each month, depending on the issues that have to be decided. The major functions of the committee are to implement the decisions of the assembly and supervise the overall operation of the main canal.

Branch Canal Committee and Farmers' Assembly

Initially, there were 15 branch canals, but one more was added later to expand the irrigation command area at the tail of the system. All of these branch committees have written rules, account books, and minutes of the meetings.

There are two organizational units in each branch : the branch canal farmers' assembly and the branch canal committee.

Fine Imposition

The farmer who breaks the rotation schedule is fined Rs. 25 the first time. If he disobeys the rules a second time, he is fined Rs. 50 and his turn for water is cancelled. For a third offense, he is not allocated any water at all. These rules are strictly followed, and few problems in water distribution and water allocation are reported.

In general, committee system seems quite effective in Pithuwa. With introduction of individual branch committees, the system is more flexible for meeting farmers need. Also, effective rules are formulated and enforced.

5. KARNALI IRRIGATION SYSTEMS. 6

Some time ago, Kailali belonged to Kalwapur Raja (local ruler), who was also known as Chisapani Chautariya. About 60 years ago Colonel Dhundi Raj Sahi, Bada Hakim of Bardiya, got the zamindari of Tikapur. He initiated the canal construction, Rani Kulo being the first built. The chaudhary of Kulariya confirms this historical event. The old people of Tikapur could identify only a few villages in existence 40 years ago. They are Derawali, Belwa, Laxhmipur, Satti, and Bhagwanpur. The rest of the area was covered by thick forest.

According to the statute of Nepal at that time, under the section of new cultivation, certain districts including Bardiya, Banke, Kailali, and Kanchanpur were encouraged to cultivate new lands. Landlords who cultivated the land were given a 10 - year land revenue holiday. New villages were settled and people brought in from other areas. These people were given shelter and food and were expected to work for the landlord. The agricultural

laborers kept moving from place to place and productivity was very unstable.

At present, agricultural laborers are hired on the basis of a one-year contract known as kamaiya. They receive food plus remuneration, and credit when they need it. By and large, the Tharus, who compose the majority of the agricultural labor force in this area, prefer this kamaiya arrangement. However, the laborers under this contract have little incentive to increase agricultural production.

Structure of Irrigation Organization.

The interrelated three irrigation systems, Rani, Jamara and Kulariya, commanding 15000 ha is located in the eastern Kailali District. The main functionaries of the irrigation organization of the three canals are the following:

Role and functions of Irrigation functionaries.

Chaudhary. The chaudhary is the chief of the irrigation system. Previously, the local landlord himself would be the chaudhary. Now, except in Jamara, Tharus have become the chaudhary. The chaudhary calls the meeting of badghars (elected village head) or assistant chaudharys to resolve issues regarding irrigation and assumes the leading role in the resolution of conflicts. He determines the date when desawar (the farmers' assembly) is to be mobilized for repair and desilting of the main canal. The chaudhary must be present during all labor mobilization and maintenance work. The pan chirage reports to him on the condition of the canal and dams.

Pan Chirage or Desawar Chirage. He is messenger of the irrigation system. The chaudhary communicates to the badghar through the pan chirage. His other major responsibility is to go to the intake every other day and supervise the system. If there is a major breach or break, he reports to the chaudhary and the chaudhary, with the help of the badghars, mobilizes people to repair the system.

Badghar. The badghar is the leader in the village. His cooperation is necessary to obtain the participation of the villagers. The badghar is responsible for the village irrigation canal, the village road, and other public works in the village. The badghar settles village conflicts. He also maintains the village water distribution schedule.

He is the chaudhary's contact to mobilize villagers for irrigation maintenance. He has to bring his quota of people during the annual repair of the canal. Each year, the badghar reports how many people are coming from his village to participate in the annual repair work. If he fails to bring that number of people, he is fined.

During maintenance and repair, he has to bring an axe to clear the tress on the canal route. Therefore, he is expected to walk in front of the group.

Nandarwa. The nandarwa allocates the area to be desilted by each village. During desawar (mass mobilization), he specifies what is to be done,

how it is to be done and certifies that the work is completed. He carries a 10-foot stick called a nan. One person per 18 inches per day in easy areas, and two persons per 18 inches in difficult, rocky portions of the canal is the basis for work allocation. His allocation of work is final, and it is strictly supported by the kulo chaudhary and other leaders.

Pachuwa. The pachuwa assists the nandarwa and works in his absence.

Lekhandaran. The lekhandaran keeps all the records. He records the attendance of the farmers in the farmers' assembly. Those who are absent from the work are fined. He is accountable to the farmers' assembly.

Budhiya. Previously, fines collected in the system as well as any unspent funds were deposited in the care of the budhiya. Now however, this function is performed by local banks. Funds collected in the system are deposited in the banks under the joint names of the chaudhary and lekhandaran.

Desawar. (Assembly of all the farmers). The desawar takes care of maintenance and repair of the system. Desawa also refers to the time when all the farmers of the system work collectively to do major maintenance of the canals.

The farmers elect the organization's leaders and during times of crises in decision-making, the desawar helps make the decisions.

When the fines imposed could not be collected, all the members (desawar) of the system go to the village of the defaulters, and force them to pay the fine. Different methods including physical assault or damage to property are used to collect the fines. The funds collected are used by the desawar for feasting.

Desawar in Action.

Pan chirage announces the date for mobilization for canal repair work at Chisapani according to the decision of the desawar. The irrigators have to be present at the work site and stay for five days.

When they come to Chisapani they make temporary sheds and set up a common kitchen for each village. Each village brings 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 which are used only for desawar.

The nandarwa carries a 10-foot long stick and the people follow him. The name of the village and amount of the work to be done is called out by the lekhandaran out of the record book, and measurement of the work to be done is designated. As soon as the work is assigned, the people start to dig the canal. The work must be completed within a fixed amount of time. 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 a 10 - foot stick with a white cloth hanging from the top.

If the assigned number of people from the village do not show up, the work is not completed. The badghar or assistant chaudhary of that village is summoned by the chaudhary of the system. If the people from the village do not appear for work, the whole village is fined. Should the village be recalcitrant in payment of the fine, the desawar visits the village and obtains the fine by any means.

After the main canal desilting and intake repair work is completed, the desawar works on its distributory and field channels. Because of the flat terrain, check dams are needed at the offtake of distributories and field channels.

Observations on Resource Mobilization for River Diversion in 1987.

River diversion took 22 days of Desawar and 26 days of bulldozer work. The total number of people mobilized in 22 days was 46,000. The quantity of earthwork excavated during this period was about 30,000 cubic meters (m^3) Table 1 gives the details of the volume of excavation done by the farmers.

Table 1. Volume of excavation (boulders, stones, gravel) done by farmers including support staff in the main canal diversion.

Date	Details of Work Done				Days
	Length (m)	Width (m)	Height (m)	Quantity (m ³)	
6-14	785.9	20.0	1.0	15,718	8
13-24	620.4	13.5	1.30	10,888	11
24-26	208.0	20.6	0.84	3,599	3
Total	1614.3			30,205	

Source: Khadka Giri field observation. February 1987.

The total volume of boulders, gravel, and sand removed by people to divert water from the Karnali into the canals is 30,205 m^3 . (This is the description of only one part of the work they have completed in diverting the river. The quantity of work done by the desawar in individual canals and intakes has not been included here.)

III. FACTORS THAT STIMULATE FARMERS TO BECOME ORGANIZED:

One or more identifiable common problems keep the organization intact. These problems remind the irrigators of the need to work together and force them to make collective decisions. The beneficiaries participate at annual general assemblies where decisions are made. The management committee implements the decision made by the general assembly of farmers. The accounts of the organization are presented to the beneficiaries for auditing and inspection. This collective decision making process at annual meetings has helped farmer managed irrigation systems to be effective and flexible so that the needs of individual places and soils can be accommodated.

No single factor or element brings water users together in an irrigation organization. Different systems have different elements which surface as the prominent feature. Water right issues, resource mobilization, water distribution, sense of belonging to the community, preservation of the individual water share, and acquisition of water and humus before the monsoon are different unifying factors. However, it is not necessary to have all these features present for an irrigation organization to function. Transformation has taken place from family owned system to farmer managed system over period of time. In the same way, the traditional functionaries role in irrigation management is taken over by the farmers. Collective decision making is institutionalized in the irrigation water management.

Water as community property:

Valuing water as a community property can become the organizing and unifying force for farmers in a given system. The effectiveness of an irrigators' 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 a well organized system, irrigation related tasks are performed collectively by the beneficiaries or group agreements are carried out by all individuals.

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

In a well organized system, the acquisition of irrigation water and its application for agricultural use are based on community decision. Committee members are elected to manage the system on behalf of the community and accountable to it. Management and decisions related to irrigation are based on the premise that water is "community property".

Water acquisition is usually a collective effort, i.e. the community pools its resources to do this either in the form of cash or kind or labor. 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 someone 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 norms and values of the system. The terms of the penalty are determined by the irrigator community. This is intended to prevent an individual from extracting more resources than allocated by the community.

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 farmer's equitable water share, and water stealing was common. In an effort to receive water more equitably and reliably, the farmers of Branch 14 decided to "communalize" the 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. Previously, the water in the canal was considered as a government resource, and the farmers believed that they would be better off by extracting as much of this resource as possible from the government. The effort to communalize the water resource in the Pithuwa system according to the community decisions 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 a system level and at branch level. This example demonstrates the importance of the perception and values of the beneficiaries regarding water as a community resource requiring collective management.

Protection of Water "Rights" as an organizing force.

The Satrasaya Phant irrigation system is an example of the need to protect water "rights" as the main factor which caused the irrigators to work as a group.

In Satrasaya Phant there had been conflict at the system's water source for many years. Farmers wanted to establish rights over the water of the Adhi Khola, the source of the system. They claim that all the water belongs to Satrasaya Phant farmers. These irrigators needed a way to insure that neighboring systems sharing the same source (a spring) would not steal water from the source. Below the intake of this system, there are four other irrigation systems. Farmers from the other systems would often break the Satrasaya Phant system's dam to obtain a greater flow of water for their systems. The farmers of Satrasaya Phant had even filed a case in the courts to establish their water "rights" , but the court declares simply that the water is to be used as it had been in the past, which did no help the Satrasaya Phant irrigators' concern. As a result, the farmers of Satrasaya Phant organized to protect "their" water share. Six members from the irrigators

group guard the source at night on a rotational basis. In comparison with the intensity of effort Satrasaya Phant farmers must expend to safeguard their water "rights," other irrigation tasks have less importance. Annual maintenance of the system and water distribution are not performed by the beneficiaries but instead by hired workers through contractual arrangement under the supervision of one of the members of the committee.

Organization Designed for Equitable Water Distribution and Minimizing Conflict.

The Pithuwa irrigation system was built and managed by the government for sometime. Water distribution by agency managers became a problem causing many conflicts in the communities. This gave an impetus to the formation of a users' organization.

The Pithuwa system has 16 branch canals. Water distribution was a difficult task causing much conflict and quarrelling. The farmers of Branch 14 were organized by one of the farmers of this branch who had grown up in a large farmer-managed system in Rupendehi district and who had also received formal training in community development activities. He convinced the other length of time each farmer receiving water to be proportionate to his landholding, the water distribution problem could be solved. Convinced by this farmer leader, a water management committee was formed in Branch 14. Within a year, the situation for water distribution improved tremendously and conflict was reduced. Influenced by the change in Branch 14, the farmers in other branches started forming branch-level water management committees. Over time, all the branches created water distribution and maintenance committees. Finally, a second level of organization came into existence. There is now a system-level committee for water acquisition at the main canal and other committees for the respective branch canals. The formation of irrigation organizations in this system was influenced by the need for equitable water distribution. At present, the system is managed by the farmers' organization. The Department of Irrigation has provided a bulldozer for desilting at the intake and an annual grant of Rs 30,000-40,000 (Us\$1,250-1,650).

Mobilization of Manpower as an Organizing Force,

The need to mobilize labor to operate and maintain the system is a task which all irrigation organizations have in common. In some systems, such as Chhattis Mauja and Karnali Irrigation system, this need is the overriding factor for which the farmers organize.

In order to make water available to the 3,000 ha within the 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 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. They do not even allow people to bring an umbrella since it is not possible to work while holding an umbrella. The three-tier elaborate structure has maintained a disciplined organization that is able to work on its own and mobilize required resources internally.

The organization has different categories of labor mobilization. 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 each village irrigates. The number of laborers required depends upon whether the task involves regular repair or emergency repair requiring twice the work force.

In Karnali irrigation system, 46,000 people were mobilized in 22 days in the main canal cleaning. They removed 30,000 m³ of silt and gravel from the main canal bed and reshaped the canal.

The factors listed above are not the exhaustive list. There are other factors which have helped bring organization to-gether.

FEATURES OF FMIS.

By and large, these systems are autonomous, self-governing entities.

The role and functions of farmer-managed irrigation organizations differ according to the type of system: hill irrigation systems, river valley irrigation systems, and Tarai systems. Their physical characteristics influence the frequency and intensity of a particular task to be performed by the irrigation organization.

Size of FMIS. Farmer-managed irrigation systems are not restricted to small units. Systems as small as 10 ha or as large as 15,000 ha have been identified in the country.

Irrigation tasks performed by FMIS. On the whole, irrigation organizations perform water acquisition, water allocation and distribution, resource mobilization, system maintenance, decision making, communication and conflict resolution tasks. These are interrelated irrigation tasks. However, the level of organization sophistication differs in accordance with the type of task to be performed by the organization.

Organizing factors. The factors that keep the organization functioning do not necessarily depend on the performance of all tasks. The organization might be forced to come into existence and continue its existence only for the performance of one or two tasks. For some systems, water distribution alone might be the cementing factor for organization while in others, it might be only resource mobilization, while in still other systems, the preservation and safeguarding of water rights at the source might be the competing force, with irrigation tasks performed through contractual arrangements employing other people. Hence, the cementing factor for organization differs from system to system.

Water as a community resource. In farmer-managed systems, water is conceived as a community resource owned by the group. The acquisition of water is a community effort. Hence, the principle of water allocation and water distribution is determined by the community as a whole. The community allocates water to individuals. The allocation principle is to be observed by

all. Any violation of the allocation principle by an individual is subject to penalty. The conditions of the penalty are determined by the community.

An irrigation organization comes into existence to perform certain tasks for making the system work. However, the organization may also degenerate and disorganize or change its role when a change takes place in the resource situation within the environment of the system.

Irrigation systems in Nepal are geared for rice cultivation, and most of the committees are active from July to August. After the rice harvest, many of the irrigation organizations become inactive. During the winter season the farmers act individually or in small groups to divert water to their fields as needed with little involvement of the system's irrigation organization.

Flexibility to respond to changes and needs. The intensity of the task that an irrigation organization has to perform is sensitive to the environment. A change in one environmental factor, whether physical or socioeconomic influences how that task is performed by the organization. Farmer-managed organizations are flexible, tailoring their methods for water acquisition, labor mobilization, and water allocation and distribution according to the needs of the farmers.

Farmer irrigation organizations can be the result of deliberate government efforts to establish such organizations. There are also examples where farmer irrigation organizations have come into existence because of government neglect of the system.

IV. CONCLUSIONS:

The farmer managed irrigation systems are, by and large, autonomous self-governing entities. The norms and values are evolved over period of time in order to protect the interest of the beneficiary participants of the system and obligations of the participants are also defined. Hence, the members of the system have to behave in conformity with the collective decisions made by the members of the system.

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