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**IMPROVING IRRIGATION SYSTEM MANAGEMENT
THROUGH FARMER-TO-FARMER TRAINING: EXAMPLES FROM NEPAL**

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FOREWORD

Evidence that physical improvements alone do not solve all the problems causing poor performance of irrigation systems has resulted in emphasis on increasing farmer participation in irrigation management activities. However, it has been difficult to find ways to encourage farmer participation. Research in Nepal in farmer-managed irrigation systems (FMIS) has shown that some have highly developed irrigation management practices while others are very weak in their ability to manage. Finding suitable **means** to transfer management techniques and innovations learned in one system to another has not been highly successful. Farmer-to-farmer exchange visits, or peer training, is being tested as a method for transferring the experience gained by farmers in a well-managed system to those where management improvements are needed.

This paper describes the process **used** in Nepal for farmer-to-farmer training. To be effective there must be a facilitator to guide the training exchange. The facilitator must have a great deal of information about irrigation rules, roles, operation and maintenance practices, and conflict management procedures of the trainers' system as well as an understanding of the management problems of the trainees' system in order to guide dialogue and interaction among the farmers. A series of examples of training visits is given. By visiting a number of systems on a tour, the trainees have an array of options to choose from that stimulates their thinking and provokes discussion among them. Preliminary analysis of the impact of peer training shows that management innovations have been adopted as a result of the training and that it is a low-cost method of motivating farmer groups to change their habits and practices.

IMPROVING IRRIGATION SYSTEM MANAGEMENT THROUGH FARMER-TO-FARMER TRAINING: EXAMPLES FROM NEPAL

INTRODUCTION

Irrigation management emphasizes productive use of water to boost agricultural production. Some farmer-managed irrigation systems have developed and adopted practices suitable to their environment that make them extremely productive. These practices enable them to carry out the essential activities related to water use, operation and maintenance of the physical system, and management of the organization. They have arrived at these practices through experience gained in a long process of trial and error. The knowledge base acquired through the process of arriving at their practices and the reasons for these practices form a valuable resource.

However, farmers in many systems have not been as successful in arriving at viable management practices and have not been able to exploit the full potential of their resource base. Hence, they face problems in acquiring water, in mobilizing resources to maintain their canal, in allocating and distributing water equitably, and in resolving conflicts. This results in less area being irrigated with a lower cropping intensity than the available land and irrigation water would support. Some of the most frequently observed reasons for this in Nepal are disagreements among the beneficiaries and external politics in a situation where until recently there were alternatives to the high costs of developing better irrigation management practices for achieving food sufficiency.

Research in FMIS under varying environments has identified that physical and organizational improvement must go together for a system to achieve its production potential. It has also identified management techniques and organizing principles which can be adopted by farmer-managed systems and farmer organizations in agency-managed systems. However, finding an effective means to transfer techniques and innovations learned in one system to another remains a problem. The usual method for researchers is to write reports to the irrigation agency and leave the agency staff to implement the findings. This has not been effective. Giving reports directly to farmers is usually not an option since most reports are not in the farmers' language or are generally too difficult for farmers with little reading experience to comprehend.

While studying farmer-managed systems in the western development region of Nepal, the vast knowledge base of farmers in well-managed systems was recognized and several experiments carried out for transferring this information to other groups. The purpose was to improve the ability of the irrigators being trained to manage the operation and maintenance of their system. The method used a horizontal approach where farmers became trainers of other farmers. It tested the hypothesis that communication between peer groups is effective when conducted in the setting of the trainers' system with the guidance of persons knowing the details of both the trainers' and trainees' systems.

This paper discusses the experience in experimenting with these methods in Nepal over the past six years **and** begins to examine the impact it **has** had on improving management. It is **based** on the authors' involvement in researching well-managed systems and in developing the training program. Participant observation and interviews with participants were used to assess the impact of the program,

CONCEPTUALIZATION

Swanson and Claar (1984) have stated that extension is an ongoing process of getting useful information to people (the communication dimension) and then in assisting those people to acquire the necessary knowledge, skills and attitudes to use effectively this information or technology (the educational dimension) to improve their quality of life. **Because** extension is an educational process rather than a monolithic structure it **can** be organized by both private **and** public sectors in different ways to accomplish a wide variety of objectives.

In **Nepal**, as elsewhere, irrigation development by various agencies has been a construction-oriented process. The view has been that if the hardware of the physical system is correct the system will function. **As more** systems are constructed and operational deficiencies noted, emphasis is shifting to development of more appropriate management, or the software dimension. With increasing recognition of the socio-technical nature of irrigation, **attempts** are being **made** to increase farmer participation in irrigation activities. An important step in farmer participation is the acquisition of knowledge **and** the ability to select among the alternatives and options available for the multitude of activities that must be performed to carry out effective irrigation. Suitable communication and extension methods are needed for **this**.

The idea of farmer-to-farmer extension training in Nepal originated when researchers investigating Farmer-Managed Irrigation **Systems** found that **some** were well managed and that others were not performing well. It **was** determined that some systems with poor performance had **much** better physical infrastructure than **some** that were performing well and this led to the conclusion that management improvement could enhance system performance. To test this it **was** decided to provide an opportunity for farmers from poorly performing systems to **see** and hear about other **management** options, including the detailed practices and effort required to make them successful, **and** then observe if changes in management practices and system performance **took** place.

This approach is based on a horizontal relationship using farmers as trainers. It assumes that communication between peer groups of farmers is an effective mode of communication. It also assumes that the knowledge being communicated will have a higher probability of being accepted **when** there is on-site observation at the time practices, rules, roles, and conflict management **procedures** are being explained. Finally, the opportunity to visit several well-managed systems in one tour allows comparison of practices in different systems. With direction from facilitators this can result in analysis of reasons for the differences by the trainees **and** discussion on what would be applicable in their own setting. Observation that **similar**

problems exist in other systems and understanding of the measures their peers have taken to overcome them are expected to stimulate action when the trainees return home.

The objective of farmer-to-farmer training is to expose farmers from a system that is performing poorly to new management options. They then need to process and adapt this information to their own needs. In situations where pressure is building for improved irrigation facilities, seeing the effort that other farmers are making to operate and maintain their system successfully provides motivation and confidence, so that they can make improvements by themselves.

TRAINING METHOD

This section draws on the experience in Nepal to identify the steps and key elements that seem to be important in conducting farmer-to-farmer training. The formulation of training methods is far from complete and will continue to evolve as more experience is gained and further evaluation of results carried out.

Two modes of farmer-to-farmer training have been used. The most frequently used has been to select a group of farmers (trainees) from a system where it is clear that management improvements could be made and to take them on a tour of systems that are well managed. The well-managed system farmers become the trainers. The other method has been to hire farmer consultants from well-managed systems to visit poorly-managed systems. During site inspection and dialogue with farmers in the systems being visited, the consultants suggest solutions to problems based on their experience. Since little experience has been gained using farmer consultants, their activities will not be discussed in this paper.

Training Site Selection and Need Assessment

Fundamental to making this type of training program effective is the ability to identify well-managed systems and to carry out intensive research to understand their management practices and the logic behind the practices. This is a process that has been going on in Nepal for the past seven years. It is also important to be able to assess the needs of the trainee farmers in order to take them to the appropriate system and to ensure that the interaction addresses the problems and issues critical for improving their management.

Training Facilitator

A facilitator is required who is well acquainted with the farmers conducting the training and who is familiar with the intricacies and evolution of the rules, roles, and practices involved in the operation and maintenance of their systems. The facilitator must also be well acquainted with the weaknesses and strengths of the systems from which the trainees have come so that he can direct the discussions to cover pertinent topics.

The facilitator first gives an orientation to the trainees. This includes an overview of the tour and the names of the systems that will be visited, schedule, and logistics. Most important is to start explaining **some** of the basic characteristics of each system using audiovisual aids if possible. The issues that the trainees will want to examine should be discussed along with how they might look for problems similar to theirs and investigate how these have been solved in the trainers' systems. For example, they will need to question the trainers about resource mobilization for maintaining their systems. They should be certain to check the information the trainers give by asking to see the work attendance **records**. On many issues, such as satisfaction with water distribution equity, they will want to cross-check the answers by posing the **same** questions to different farmers from different parts of the **same** system.

The facilitator travels with the trainees and attends to the logistics of travel, food, and lodging, and introduces them to **the** trainers in **each** system. His role is to facilitate but not lead the discussion in each meeting. In listening to the discussion he notes **what** topics have not been covered and may occasionally interject a question to the trainers to direct dialogue into areas that have been missed. The major exchange must be between the trainers and trainees but a facilitator is necessary to keep the discussion moving and to ensure that each topic relevant for the trainees is covered. If the facilitator **has** in-depth knowledge of the management of the trainers' system he will be able to ensure that all the experience and information are tapped.

Trainee Selection

Not all members of a poorly-managed system can be taken on a training tour. Trainee selection is very crucial and the degree of success of the training largely depends upon the ability to identify the right people to participate. Participant trainee farmers should possess leadership ability and their peers must have faith in them. They must be from the farming community, be dedicated to the improvement of their irrigation system, and have good communication skills. The trainee usually represents the irrigation management committee. Trainee selection may be done by the beneficiaries themselves or by officials involved in supervising the **system** if it is managed by an agency. A **group** of manageable size (ten to twenty depending upon facilities for food and lodging) should be **taken** for the training.

The Training Tour

In visiting the trainers' system it is useful for the trainees to be first given a tour of the physical system -- the canal, distribution system, and the command area. This visual aid gives the trainees insight into similarities and differences as compared to their own system. They should also observe the agricultural system, areas where maintenance requiring resource mobilization must frequently be done, water distributing devices, and all types of records that are kept. In cases **where** a regular meeting is planned in the trainers' system, it has at **times** been possible to plan the tour to coincide so the trainees could observe the meeting. Such an opportunity to observe an organization in operation is valuable.

Farmer Interaction

During the physical inspection tour of the trainers' system there **should** be an approximately equal number of trainer and trainee farmers to make it easy for the trainees to ask questions. The tour of the physical system often stimulates the most discussion and it is useful not to hurry this interaction. While moving about the system the group is usually spread out and it is impossible for the facilitator to provide much direction. It is, therefore, important to have also a more formal meeting where the trainers and trainees can sit in a circle for discussion.

The trainer farmers usually start with a description of the history of their system. They are very good at describing improvements, expansion, and the difficulties that they face in operating **and** maintaining the system. They also need little prompting to describe emergency situations when they have mobilized quickly to recover from destructive floods or a landslide. Since they are *so* familiar with their rules and their methods of enforcing them they tend to forget that others do not understand the underlying principles and relationships that make it possible to achieve their goals. It is often necessary for the facilitator to interject questions. For example, "What do you do if someone does not **come** to help maintain the canal when it is his responsibility to come?" In this way **all** of the routine operation **and** maintenance **tasks** can be investigated and the **way** they are carried out understood. The facilitator's responsibility is to stimulate the dialogue while not dominating it.

Follow-up to the Exchange Visit

In most cases the tour **has** served to motivate the trainees to return to their system and initiate changes. However, they face the difficult task of convincing the beneficiaries who were not able to make the visit and who do not have the benefit of the detailed information and observation **that** the trainees acquired. In a number of cases the trainee farmers asked the facilitator to attend a **mass** meeting in their system to assist in communicating with all of the beneficiaries.

SYSTEMS VISITED -- THE TRAINERS' SYSTEMS

The organizations of eight systems have been used as a training resource. One, in the inner Tarai in the Chitwan District, called Pithuwa, has a command area of about 1,000 hectares (ha). Another on the Tarai near Butwal, in Rupandehi District, called Chhattis Mauja, **has** a **command** area of more than 3,000 ha. Two communities in the hills with well-managed irrigation systems are Argali and Chherlung, in Palpa District. They are located about a two-hour walk apart. Each is only a 3-4 hour walk from a major road making them easily accessible (in the context of Nepal). Argali has four irrigation systems with command areas of 10-95 ha and Chherlung two of 35 and 17 ha.

Our research found all six of the systems in Argali and Chherlung to be effectively **managed** with sophisticated organizations and technologies.

Farmers in these systems practice extremely intensive agriculture, cultivating three crops **per** year -- monsoon rice, winter wheat, and premonsoon ~~maize~~. **Monsoon** rains came floods that damage the diversion **structures** and landslides that block canals, necessitating the mobilization of a large amount of labor each year to maintain the systems. The organizations are able to mobilize labor and cash for maintenance and are able to enforce fines on their members who are absent from work. Water is allocated either in proportion to area irrigated (Argali) or by purchased shares (Chherlung), and the property rights are well defined. Through the use of proportioning weirs and rotational distribution, water is distributed very closely in accordance with the pattern of water allocation entailing no measurable head-tail discrepancy. **One** of the systems in Chherlung has a water-powered mill owned and **managed** by the irrigation organization which provides income for assisting with system maintenance. Nearly all the farmers of these systems are able to explain the structure of their organization and are very willing to explain **how** it operates.

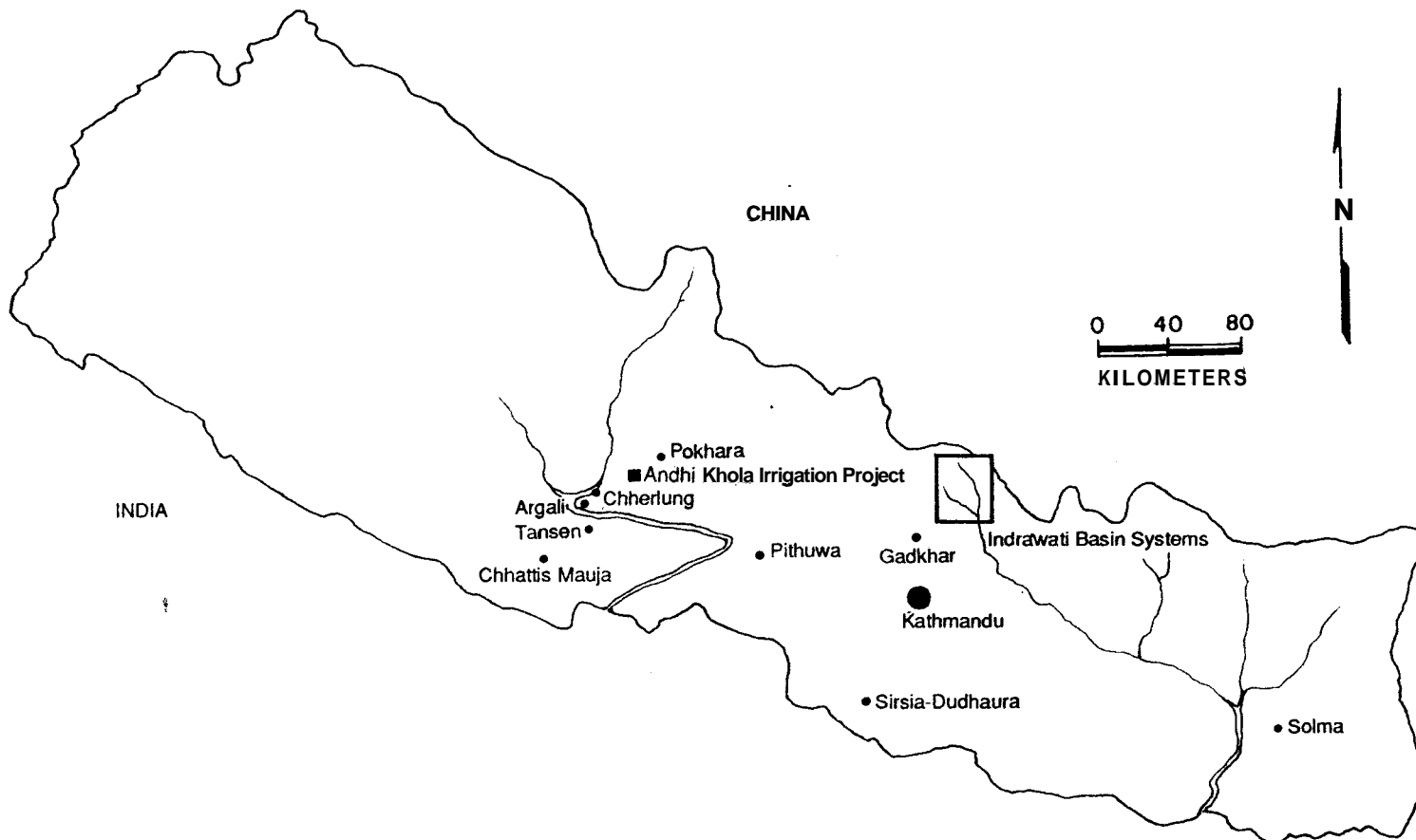
The Pithuwa irrigation system was designed and developed by the Department of Irrigation, Hydrology, and Meteorology (DIHM). The Pithuwa system farmers have, however, taken over the operation and most of the maintenance of the system. To manage its activities the farmers are organized into branch canal groups with representation on a system-level committee. The silt load of the stream feeding the system is extremely high during floods, reducing the discharge in the canal after each heavy rain until it is cleaned. The strong organization **has** carried out effective mobilization of resources both from within the system and from the Department to keep the **system working** effectively. The system often has less water than necessary to irrigate all fields. Strict water allocation before planting each season **allows** farmers to determine how much of their land to plant and has allowed the system to **expand** beyond the original design. The organization has been **successful** in controlling water distribution according to the allocation pattern thus reducing conflicts during times of water scarcity. A cropping intensity of about 250 percent is achieved with the primary crops being monsoon rice, winter wheat, and spring maize or mustard or potato.

The Chhattis Mauja irrigation system serves 54 villages and was built and is **managed** entirely by farmers. It **has** village, branch *canal*, and system levels of organization to manage irrigation activities. They **have** written rules and strict control for resource mobilization and water distribution. As with Pithuwa, the Chhattis Mauja system diverts water from a river with a high silt load and requires constant repairs to the diversion and desilting during the rainy season. The cropping pattern is similar to that of Pithuwa but in the winter and spring there is not enough water to irrigate all of the ~~command~~ area since the water in the source is shared with several other **systems**.

EXAMPLES OF FARMER-TO-FARMER TRAINING IN NEPAL

Gadkhar Irrigation System, Chaudhanga, Nuwakot District

This **105-ha** hill irrigation system was constructed by the Department of Irrigation, Hydrology, and Meteorology in 1979 under the World Bank-financed



Location of Irrigation Systems involved in Farmer-to-Farmer training

Andhi Khola Irrigation Project, Galyang, Syangja District

This project is a joint irrigation **and** hydroelectric project being implemented by the United Mission to Nepal. A delegation of seven ~~member~~ farmers of the management committee and a project engineer visited the Argali and Chherlung irrigation systems while their project was in the planning and organizing stage. The purpose of the visit was to explore the options and consequences of different methods of water allocation in order to determine what would best fit their needs. They were particularly interested in the Chherlung systems where water is allocated by purchased shares allowing for transaction of water rights separate from land transfers. Eventually they adopted a similar concept in planning their system. In addition, there was an exchange of information about the effort required to keep a system operating.

After their visit to Chherlung, the management committee requested that two of the officers of one of the Chherlung systems visit their project and talk with a larger group of farmers about how water transaction occurs. The project being still in the construction phase, it is yet to be seen what impact the interaction with the farmers of Argali **and** Chherlung will have in actual management of the system.

Chherlung Thulo Kulo System, Chherlung, Palpa District

Although Thulo Kulo is a well-organized and well-managed irrigation system, frequent canal breaches require substantial labor mobilization to keep it operating. The organization is continually seeking financial assistance to make their canal more stable. Since many water-powered mills are operating successfully in the hill areas of Nepal it was suggested to the irrigation organization that they exploit a site where there is a drop in the canal to generate mechanical power to drive milling machines **and** earn income that could be **used** to maintain the canal.

While there were *many* examples of successful privately-owned mills, the organization was skeptical about both the feasibility of a mill **in** their community and the ability of the irrigation organization to own and operate it. They were unwilling to take the risk of establishing a mill without first seeing one that was managed by a large community. It was arranged for a delegation of 15 farmers from the Thulo Kulo organization to visit Arkhala and Bhangbari villages in Nawalparasi district where water-powered mills **are** managed in each community. The Bhangbari mill is incorporated into an irrigation system. Since the Arkhala and Bhangbari communities have a much poorer resource base than Chherlung with respect to grain to be milled, the group from Chherlung was convinced that it was feasible for them to establish and operate a mill. Through their visit they ~~confirmed~~ that the physical setting, market, operating costs, **and** management options were all favorable for them to go ahead with the project. Although they had been ~~informed~~ several times by experts in mill installation that their irrigation activities would not be disturbed by such an installation, it was more reassuring to make their own observation of a similar situation.

Returning to their own community they convinced the rest of the irrigators in their system of the feasibility and benefits of installing an irrigation organization-owned-and-operated mill. They took a loan of **Rs 83,000 (US\$4,600)** from the Agriculture Development Bank of Nepal for purchase of the machinery, equipment, and materials. In addition, about **Rs 35,000 (US\$ 1,944)** worth of labor was contributed on the basis of water shares in the system. The mill was installed in early 1984 and has been operating on a regular basis since then.

A mill management committee of 30 irrigators with a chairman and a secretary supervise the mill operation. Two operators were hired and committee members take turns attending the mill each day to keep the accounts. Income has been sufficient to pay the loan in five years and they now expect a net annual income of **Rs 10,000-20,000 (US\$416-833)** which can be used for canal improvement. This is **Rs 300-600 (US\$12-24)** per ha of irrigated land which is 150 percent higher than the maximum rate for user fees in agency-managed systems. In addition, they have the benefit of convenient and cheap milling of their grain. Some trainee visitors to this system are also planning to adopt similar enterprises in their villages. The training program that convinced them of the feasibility of the scheme cost **Rs 1,500 (US\$84)**, i.e., **Rs 100 (US\$5.50)** per trainee.

Solma Irrigation Project, Solma, Terathum District, East Nepal

The Solma irrigation project is an irrigation scheme initially financed by the district panchayat (district level political unit) in 1975. The Koshi Hill Area Rural Development Program, a British aid project, financed rehabilitation and improvement in the Solma canal in 1978 and 1983. Since contracts were given for construction, only some beneficiaries who either won a contract or were hired by a contractor worked on the project. Even after huge investments for improvements to the physical system, the project was not a real success. There were social and institutional problems as well as technical problems hampering the project (Pant 1987).

In an attempt to improve the performance of the system and the investment in irrigation development in the project area; a delegation of five farmers from the Solma system and ten farmers from two other systems of the Bhojpur and Dhankuta districts visited Argali and Chherlung in November 1984. The trainees were chosen on the basis of their participation in the canal work, their likely ability to understand management techniques, and demonstrated leadership and communication skills. Trainee farmers were influenced by what they saw and heard in Argali and Chherlung. They were convinced of what could be done by a community if people organized properly.

As a result of the visit, the farmers of Solma worked harder to improve their system. In the ongoing rehabilitation program they provided **823 man-days** of free labor which was unprecedented in Solma. After the visit to Argali and Chherlung, a mass meeting was held to form a water users' association and some of their old committee members were replaced by persons who had gone on the training tour. Meetings were held to establish a code of conduct and decisions were made about the maintenance of the canal and ways to ensure more equitable distribution of water. A person to patrol the canal

was employed and his job and remuneration were specified. Other decisions made by **the** association dealt with responsibility for tools, election of a new committee every year, and provision for regular meetings. Rules were made against stealing water and punishment for violating the rules fixed. The beneficiaries were required to **make** a yearly payment based on area irrigated to pay the person patrolling the canal.

The most important achievement after the tour **was** a change in attitude-households **who** were previously unwilling to participate now **help** with maintenance work. More farmers **are** confident that **they** will get the water they require. Despite the frequent threats from community members **who** had won contracts, the association's success in mobilizing more than 300 man-days of labor for repairing the canal during the monsoon can be regarded as a great achievement. The eight-day training cost Rs **400** (US\$22 at that time) per trainee (Pant 1987).

Sirsia-Dudhaura Irrigation System, Parwanipur, Central Tarai

The Sirsia-Dudhaura system **was** developed and is **managed** by the Department of Irrigation. The system has a command area of about 1,350 ha. The problems of the **system** were identified as head-tail discrepancy in **water** distribution, unreliable water delivery, irregular maintenance, and insufficient irrigation structures and field channels.

The Irrigation Department's Irrigation Management Project decided to use the **Sirsia-Dudhaura** system as a pilot area to identify and test **methods** for improving irrigation management. Association organizers were employed **by** the Project to guide the beneficiaries in the system in forming viable **user** groups. The user groups were then to take responsibility in assisting the Department staff in operation and maintenance. In order to reinforce the ideas of beneficiary involvement in these activities, it was decided to select key farmers from the Sirsia-Dudhaura system for a training tour to the Pithuwa system which is of comparable size and where beneficiaries have taken over the management from the agency.

A group of 16 farmers was taken to the Pithuwa irrigation system in late **1987**. Several engineers, overseers, and other experts also attended the three-day program. Trainer farmers from Pithuwa described their system **and** how it came about that they took over the management of the **system**. They explained their management procedures and the change in economic condition of farmers after they became organized and disciplined in carrying out irrigation activities.

The Pithuwa farmers easily convinced the Sirsia-Dudhaura farmers of the effectiveness of their water users' association. While the association organizers had been able to describe the functions that **needed to** be carried out by the Sirsia-Dudhaura user groups, the trainees were not convinced until they observed and heard firsthand from the Pithuwa farmers of the value in having a strong organization.

when the Sirsia-Dudhaura farmers returned to their system **they** described to their peers what they had observed and learned. They discussed

these issues both in meetings and individually. They became more organized and cooperation and communication between different villages served by different levels of channels were enhanced. Cooperation, unity, and discipline were better understood and consensus was reached that the user groups should be kept nonpolitical. The cost of the training program was about Rs 500 (US\$22) per trainee.

The following conclusions were reached in a study carried out by the Department of Irrigation's Irrigation Management Center to assess the impact of the Sirsia-Dudhaura system farmers being trained by the Pithuwa system farmers (Irrigation Management Center 1987):

1. Participant farmers have played a significant role in convincing their fellow farmers of the need to be organized into user groups. When they saw the joint action, involvement, and democratic decision making among the Pithuwa system farmers, they understood how an organization could help them achieve effective irrigation management.

2. Farmers have been successful in resolving conflicts through mutual negotiations with the user group. They have realized that organization brings discipline.

3. They have recognized the importance of systematic record keeping to organize maintenance.

4. They have realized the importance of having meetings as a forum to maintain effective communication among themselves.

5. They have shown willingness to switch to improved cropping patterns and cultivation practices.

6. They have realized the importance of mobilizing their own resources to take care of regular operation and maintenance. This was demonstrated when for the first time in nearly three decades of the system's existence, the farmers joined together to clean more than 29 km of canal which gave a dramatic improvement in ease and extent of coverage for wheat irrigation.

7. They observed a strong sense of system ownership among the Pithuwa system farmers. Trainee farmers are playing a positive role in instilling the feeling of "collective ownership awareness" among the farmers in their area.

for assisting these systems to achieve higher food production in the existing irrigated area and to expand irrigation facilities to areas not presently

improve their systems. A series of farmer training visits was initiated to overcome these difficulties.

Two groups of farmers from these systems were taken to Argali and Chherlung in January and May 1988. In Argali one group observed the annual meeting of one of the irrigation systems. The visitors were able to see firsthand: 1) the procedures for the meeting, 2) how the past year's activities were evaluated, 3) an election of irrigation officials, 4) settling of accounts for the past year, 5) establishment of new operating rules, and 6) the procedures for planning irrigation activities.

In Chherlung they were able to observe routine maintenance work being done. An important lesson was learned in how to set priorities on work to be done to best utilize external assistance. After explaining the rules for operation and maintenance, the roles various functionaries play in managing the system, and how conflicts are managed, the trainer farmers suggested that the visiting farmers make rules and regulations suitable to their own environment. The trainers also emphasized the need for the managing committee to be committed to work hard to gain the respect and confidence of all the beneficiaries so that directives would be carried out.

After the training visits, the attitude of the trainees changed and they identified many weakness in their own systems. Most became confident that many of the principles they had learned were applicable to their system. When they returned home they organized management committee meetings and conducted assemblies where all beneficiaries were requested to attend in order to convince those who were not able to go on the tour of the value of building a stronger management structure and organization. The trainees proposed to follow the lessons learned from Chherlung and Argali.

Many farmers have land served by more than one canal and there is opportunity for the information gained on the study tour to be used by other systems. This has happened in several of the systems in this area. In one case a trainee farmer assisted three other systems to set up management committees and to begin the process of formulating rules for operating the systems.

Table 1 presents some preliminary indicators of the management changes after training. These indicators show that new activities are being adopted. The direct cost for operating the training program was about Rs 500 (US\$22) per person.

CONCLUSION

The preliminary results of the training program clearly demonstrate the effectiveness and wide applicability of such a process. The cost of these study tours is minimal compared to tours taken overseas by agency officials to learn about irrigation management. However, a systematic in-depth study needs to be conducted to evaluate the benefits related to the costs of carrying out a large-scale program of this nature. If such a program were

desirable, it raises the question of how to institutionalize it and still keep it effective.

Table 1. Preliminary indicators of management changes after the training program.

Activities	Irrigation Systems							
	Dhap canal	Majh canal	Siran canal	Ghatta Muhan	Majh canal	Siran canal	Tallo Chapleti	Chap Bot canal
New operating rules	1	1	1	1	1	1	1	1
Improved canal maintenance	1	1	1	1	1	1	1	1
Meetings & minutes	1	1	1	1	1	1	1	1
Written records	1	1	1	1	1	1	1	1
Regular meeting place	0	1	1	0	1	1	1	1
Planned water allocation	1	2	2	2	2	2	2	1
Planned resource mobilization	0	2	2	2	2	2	2	1
Installation of proportioning structure	1	2	2	0	2	2	2	2
Establishing water powered mill	0	2	0	0	0	2	0	0

Key: 1 : Irrigation management activities initiated and continuing after the training occurred.
 2 : Plan has been made for execution.
 0 : Either the activity does not exist, or there has been no change in previous practices.

One possibility that could be explored would be to make **several** of the sites that **have** already been frequently utilized into training centers. **The** trainers already have a great deal of experience in explaining their irrigation management practices and have only been paid on an ad hoc basis for the **many** days of effort they have put into extending their experience to others. By assisting them to develop a curriculum, giving them training in

how best to use the resources of their system to communicate the knowledge they have gained through experience, and developing guidelines for logistic and administrative detail they could run very effective training courses at a minimal cost. If this training enterprise is taken on by the irrigation organization it will be another way for them to mobilize resources to upgrade their systems.

An added benefit of expanding such a program would be to stimulate the search for other well-managed systems. The process of such a search and subsequent investigation into the details of their management practices would give further insight into what it takes for effective irrigation management. It would provide a valuable opportunity for agency staff to understand farmers' interests and ability in irrigation management as they carry out the program of detailed field investigation to expand the number of sites that are used for training visits.

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