

# A COMPARATIVE STUDY OF FARMER-MANAGED AND AGENCY-MANAGED IRRIGATION SYSTEMS

Ratna Sansar Shrestha  
Nirmal Kumar Sharma<sup>1</sup>

## OBJECTIVES OF THE STUDY

The primary objective of this study is to make an enquiry into the operational style of two irrigation systems in order to derive a logical base for farmers'/users' participation in the management of the Bhairahawa-Lumbini Ground Water Project (BLGWP), an irrigation system managed by the Department of Irrigation, Hydrology, and Meteorology (DIHM) of Nepal. The study is designed to make an independent study of some aspects of the Chhattis Mauja farmer-managed irrigation system and the BLGWP in the command area where the two management systems are functioning and the farmers are taking advantage of either or both options. The study is further designed to observe the views and behavior of the water users, some of whom are using water from both systems and others who are acquiring water from the BLGWP.

## NEED OF THE STUDY

The most spectacular and unique aspect of the BLGWP stage I area is that the farmers in certain areas, particularly around Semara, Karahiya, and Bhalwari, still maintain traditional ties with the Chhattis Mauja surface water irrigation system, despite having used the BLGWP's irrigation facilities for the past three years. The BLGWP's envisaged objective of organizing the water users' group and mobilizing them for the operation and maintenance of the system has been only partially successful. The relations between the farmers and the project could hardly be called a harmonious one.

Under the circumstances the study is not only timely but also appropriate. From the point of view of the planners and policy makers this study will, we believe, give not only an in-depth analysis of the current situation therein but also be very useful for the stage II command area. It could also provide suggestions for organizing the water users and gain both their confidence and involvement in future irrigation projects which are now in the planning and implementation stage.

## METHODOLOGY

The methodology we adopted could be classified broadly into two methods: descriptive and analytical. The data for analysis and description were collected from primary and secondary sources using questionnaires, interviews, and formal and informal meetings.

To obtain background on the irrigation projects we researched the historical development of the systems.

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<sup>1</sup>Ratna Sansar Shrestha and Nirmal Kumar Sharma are Directors of Action Research, Inc., Kathmandu, Nepal.

During the field test we also organized formal and informal meetings among the water users including pradhan panchas (elected village leaders), upa pradhan panchas (vice village leaders), ward chairmen, and members of the three panchayats (local political units) under our study. System managers and agricultural extension agents enabled us to broaden our descriptive perspectives as well as cross-verify the data generated by the survey.

## SAMPLE AND SITE STUDY

The three panchayats covered by the study are Karahiya, Madhubaliya and Gangabaliya Village Panchayats which are served by three BLGWP ground water tube-well units, viz. Karahiya, Bhalwari and Semara. In those areas the facilities of the Chhattis Mauja Irrigation system and those of BLGWP overlap. Three sets of questionnaires were prepared following a pre-test: one for the local leaders who are considered to be influential in the area, one for the managers, and finally the last set for the farmers/users. Total households and total command area were codified and a random sample obtained. The sample was selected from the area where the two irrigation systems overlap.

### CHHATTIS MAUJA IRRIGATION SYSTEM

About 150 years ago a farmer named Jeddha Tharu was given permission to dig a canal system from the Tinau river in Butwal and link it with Kumari village in the plains of the Tarai. Thus the Chhattis Mauja Irrigation System came into existence as a large-size farmer/user-managed irrigation system designed to serve 36 maujas, or villages. It is also called the Kumari irrigation system, for it served the Kumari village in the beginning. At present, the system irrigates approximately 3,000 hectares (ha) of land in 54 villages in eight panchayats. More than 25 kilometers (km) in length, the canal of Chhattis Mauja ranges in width from 4 meters (m) to 10 m with a depth varying from 1 to 4 m.

It is a large-size farmer-managed irrigation system. The system has effectively undertaken water management for 3,000 ha of land. The water users are participating in the decision-making process concerning water management. A three-tier organizational structure is formed by the water users/farmers within the command area to manage the system. The committee is most concerned with the management of water for the monsoon paddy cultivation. During the period of water scarcity, the committee becomes quite active. The committee is responsible for the repair and maintenance of the canal and also for water distribution to the farms in its command area. About sixty thousand beneficiaries are mobilized by the committee for maintenance of the main canal each year. In cases of non-participation or failure to comply with the regulations, penalties both in cash and kind are levied against the offenders. Frequent non-compliance may lead to dismissal from membership in the irrigation network resulting in cut-off of the water supply.

During the field survey we organized a meeting designed to help interaction with the governing board of this irrigation system. The meeting took place at their headquarters and was presided over by the newly-elected chairman of the governing board. Local farmers also participated.

During this meeting, the farmers explained some of the problems they are facing. The committee is facing difficulties in maintaining the canals and

getting cooperation from the water users. The main problem in maintaining the canal network at present is the paucity of log, timbers, and other forest products used for repairs, the procurement of which has become very difficult. The lack of enthusiastic cooperation on the part of the farmers/users can be attributed to the fact that they are obtaining water from other sources--the tube-wells.

An increase in the population has created an increased demand for water for irrigation, home use, and new industries. However, the supply of water has been adversely affected due to deforestation, bringing additional land under cultivation, and construction of highways and feeder roads.

Over the years, there has also been significant change in social values. One of the reasons for such change is the availability of a relatively free water supply from the agency-managed system, BLGWP. In the farmer-managed system the users had to work to acquire and distribute water themselves. With water from the government-managed project, community participation has eroded to an extent which has adversely affected the concept of farmer management. Basic problems faced in the management of the traditional irrigation system were changes in the social values and the role played by vested interests. This study did not go into the details of such changes in social values, but it was able to discern that the farmers/users were effectively obtaining an adequate supply in the head area while the establishment of new allied occupations such as dairy farming and cottage industries have diluted a sense of communal belonging. Development of different occupational patterns and migration of rural population to urban areas are responsible for the main changes in the social values.

#### Farmers' Participation in Chhattis Mauja

Beneficiaries of the Chhattis Mauja irrigation system are expected to provide labor to operate and maintain the system. Members failing to contribute labor are charged a fine fixed by the committee. The committee chairman reported that the cash income of the organization is increasing each year. The chairman attributed this increase to the fine rate fixed by the committee. The man/day rate fixed by the committee tended to be lower than that of the prevailing man/day rate for unskilled labor in the vicinity. This has induced some users to pay in cash instead of contributing labor.

When other local leaders and farmers were asked about this issue, additional reasons for the increase in cash contributions were mentioned. The difficulty of obtaining forest products needed for the diversion of the water in the canal and for repair and maintenance was cited as a reason. Deforestation and new government rules restricting the cutting of trees make it much more difficult to obtain these resources. The problems associated with obtaining forest resources has discouraged some farmers from contributing labor for the maintenance of their system; some feel it is easier to pay the cash fine. The migration of the rural population to urban centers, reducing the size of the labor resource was another reason that users sometimes found it easier to pay in cash.

#### BHAIRAHAWA-LUMBINI GROUND WATER PROJECT

A feasibility study of the BLGWP was undertaken in 1975 by Tahal Engineers Ltd. of Israel. Following the completion of the feasibility study, His Majesty's Government of Nepal (HMG) asked the International Development Association (IDA) of World Bank to finance the project. The World Bank sent a

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Group Mission to undertake appraisal of the project. The IDA agreed to provide a loan in 1976 for US\$ 9 million which covered 60 percent of the cost of the project. The project started delivering water in May 1980.

The project is located in Rupandehi district, Lumbini Zone. The approximate altitude of the area is 100 meters (m). Sandwiched between the Dano river in the west and Rohini in the east the project site is known for its alluvial deposits.

The main objective of the BLGWP is to provide water for irrigated agriculture to allow two or three **crops** per year. To achieve this, the project included the construction of 64 deeper, tube-wells ranging from 100 m to 200 m in depth. Irrigation control structures to serve an area of approximately 120 ha around each tube-well were planned. The project included provisions for installing electric lines to provide power to run the tube-well pumps, construction of 96 km of village roads, and the construction of offices to house DIHM staff in Bhairahawa.

According to present estimates of available water resources, approximately 60 million cubic meters of water can be pumped annually from the confined aquifer of the Gangetic sediments. This quantity would suffice to irrigate an area totalling about 7,500 ha.

## Farmers' Participation vis-a-vis BLGWP

Utilization of tube-well water is one of the indicators of the participation by the beneficiaries in the system. When the tube-well discharge rate was calculated, the figure was not encouraging. Even during the peak paddy season period the discharge is relatively low. The working capacity of the pump is 18 hours a day. However, BLGWP records show that the pump worked for less than 4 hours a day on the average.

The formation of separate water users' groups for different tube-wells is an indication that BLGWP is trying to incorporate the water users in the decision-making process of every tube-well system. To assess the water users' participation in the decision-making process we examined the minutes of the water users' committees' of all three tube-well systems included in the study.

The water users' committee of the Bhalwari tube-well command area has yet to meet formally, hence nothing has been recorded in the minutes. The committee serving the Karahiya tube-well area had met only once, in 1982, at which time the decision taken by the committee clearly indicated that the BLGWP management failed to make provision for additional turn-outs and timely repair of the channel breaches even when the responsible officials were aware of the situation. The committee serving the Semara tube-well area revealed that only two meetings have been held, both in 1986. At one of these meetings the committee proposed the imposition of a fine of Rs 15 (US\$ 0.68) per man-day to be charged against users who fail to contribute labor when required. There is no record of the implementation of this decision.

Regarding the users' participation in the operation and maintenance (O&M) of the project as measured by payment of the fees for use of the water, BLGWP records show that only Rs 60 (US\$ 2.75) have been paid. Furthermore, the water users do not consider themselves responsible for the minor repair of breaches in the tertiary channels

Regarding participation in the construction of the channel system, the farmers were paid for the land utilized by the channel network, which was designed by the project engineers and built by contractors employed by the project. The farmers were not involved in either design or construction.

## FINDINGS AND CONCLUSIONS

### Membership in the Two Irrigation Systems

Nearly half of the farmers are entirely dependent on the farmer-managed canal. For the farmers having alternatives, the main alternative is the tube-well system. This helped us conclude that the tube-well system is a strong alternative source of irrigation water in the command area under study. The DLGWP could develop the tube-well system without competing with the farmer-managed system.

### Design of BLGWP

The farmers reported that they were not involved with the design of the channel system for the project. Channels with brick lining and cement pointing were found in the head areas. All other channels were constructed of mud. During the meeting with the farmers, a number of them asked why the project provided better structures only in the vicinity of the pumphouses. Some farmers voiced the opinion that this discrimination discouraged them from participating more actively in the project. The analysis of the situation helped us to conclude that the users must be involved from the design phase of the project to assure more active cooperation.

### Water Allocation

For the purpose of this study, we have distinguished demand from need on the basis of who decides the timing of the application of water. If the farmer/user decides the point of time he needs the water and is supplied with water accordingly, then the allocation is considered to be made on demand. Whereas, if the water users' group/committee or some one in management decides when any particular area needs water and arranges for the supply, then it is the case of water being availed on the basis of need.

The leaders believed that water under the Chhattis Mauja system is allocated on the basis of need and they desired replacement of it by demand as a criterion. On the other hand, the farmers/users believed that at present labor contributions determine the water allocation at the farm level, and like the leaders, they also advocated demand to be the desirable criterion of water allocation.

The criteria for water allocation helped us reach the conclusion that in the BLGWP tube-well system at present the basis for water allocation is a combination of both the need and demand. This is due to the fact that the water requisition form filled by a particular farmer/user has to be endorsed by the chairman of the water users' committee before the water is supplied to the farmer. Water would not be released until three separate, properly endorsed requisition forms are completed for the particular turn-out point.

## Users' Responsibilities and Contributions

The majority of the farmers believed their major responsibility to be performing assigned work whereas most of the local leaders and managers felt that bringing together collective cooperation was their major responsibility. This helped us conclude that different groups within the system have different responsibilities. The hypothesis test also supported our finding to this effect.

The Chhattis Mauja system is operated and maintained primarily through labor contributions from the users. Some cash is collected in the form of fines imposed upon those who fail to contribute labor. In the BLGWP system the water users' contribution is a cash fee assessed for use of the water. This is one of the major differences between the two systems.

In the BLGWP system it was observed that from May 1984 when water charges were levied to May 1987, less than Rs 60 have been realized from the water users as water charges. The water rate fixed by BLGWP is Rs 200 (US\$ 9.13) per bigaha (0.67 ha) per annum. Neither the users nor the managers considered the rate to be too high in comparison to the labor contribution practice of the farmer-managed irrigation system where the labor contribution is at least 12 man-days per annum and calculated at the local wage rate of Rs 25-30 per day. It sometimes goes up to 30 man-days. When trying to identify the reasons behind the farmers' aversion to pay the water charges at the rate fixed by the BLGWP even when they consider it reasonable, we could identify the following reasons:

1. Water from the tube-wells is less preferred by the farmers because it does not contain any fertilizing elements which are found in the Chhattis Mauja surface water.
2. The tube-well system is considered by most as a secondary source of irrigation water.
3. Farmers prefer contributing labor over having to make cash contributions. It is not the rate that is not acceptable to them but it is the nature of the contribution which is not of their preference.
4. The farmers/users are aware of the minimum fixed overhead For the operation and maintenance of the tube-well system. Annual minimum overhead for each tube-well, except for repair and maintenance in case the pump goes out of order, is estimated to be Rs 72,000 (US\$ 3,287.67), which includes the electricity charges at an average rate of Rs 5,000 (US\$ 228) per month and the salary for ditch-rider and pump operator at the rate of Rs 500 (US\$ 22.83) each per month. The farmers believe that if they start paying the water charges, they might be later given the responsibility for the O&M of the unit, and they would not be able to meet the costs. BLGWP should be able to clarify this issue with the water users and make a commitment as to what extent and for how long BLGWP can subsidize the overhead which can be expected to go up along with the change of pump operation hours from the current average operation hours of less than four hours a day should the tube-well water usage rate increase to the maximum capacity of 18 hours a day.

## Conflict Resolution

In the Chhattis Mauja irrigation system conflicts are settled democratically by involving all users. In cases of water-related conflicts

concerning the groundwater irrigation system, it is the chairman of the water users' committee who is most involved with resolving the conflicts.

### Relationship Between BLGWP Users and Managers

When we observed the relationship between the farmer-/users and managers at the farm level (the farmers and the pump operator), we were impressed by its cordiality. We could find no records of complaints reported against the pump operators. We also did not hear any complaints against the water users from the pump operator. (It should be noted here that the pump operator has control over the discharge of water from the tube-well for irrigation on demand from the water users.) This enabled us to conclude that the relationship between the farmers/users and the managers at the farm level is not the key factor responsible for poor participation of farmers/users in the BLGWP tube-well system.

### Users' Attitudes Toward a Farmer-managed System for Tube-wells

A model test was conducted with a view to test the farmers' attitude towards the community (user) management system, in order to explore whether each tube-well unit could be brought under user management as a separate, independent system. Fishbein's Attitude Test used to test the hypothesis helped us reach the conclusion that since farmers/users lack a strong positive attitude towards the former-managed tube-well system, it is not possible that each tube-well unit as a separate system be brought under user management at this point in time.

### Incentives

We came to the conclusion that the incentive to increase participation in the BLGWP for the farmers would be the opportunity to make labor contributions. Not having to pay any dues is a major incentive for the managers. Thus the incentive in the minds of both the farmers and managers is virtually the same in the sense that both groups have an aversion towards making cash payments.

### POLICY IMPLICATIONS

The agency-managed irrigation system is a relatively new experience for both the farmers/users and the managers, planners, and policy makers in the limited areas where it has been introduced in Nepal, whereas the history of farmer-managed irrigation systems is long. The outcome of this study could be a guide to the planners and the managers at both the national and community levels. The following recommendations are offered:

1. Policy makers should take into account not only the mode of irrigation but also the location of farms to which the irrigation water is to be channeled. The system should be designed in such a way that it is geared to serve the whole command area instead of the land in the vicinity of the pumphouse primarily, as in the case of the ground water irrigation system.

2. Policy makers should note that the farmers'/users' prefer user management of an irrigation system. The success or failure of the irrigation system depends upon the extent to which the farmers/users identify themselves as one of the components of the total system. Our study has clearly revealed that farmers/users will not consider an irrigation network their property unless they have been consulted since the installation of the system.

3. The farmer-managed irrigation system faces technical and financial constraints in infra-structural matters. The Chhattis Mauja system is an outstanding example. This clearly is an area where policymakers at the national level should formulate policies which can further strengthen community involvement in irrigation management such as providing funding for permanent structures. It has been found that due to the increase in the population density caused by uncontrolled migration, changes have occurred in the social values resulting from the urbanization process and farmer-managed irrigation systems are encountering hitherto unforeseen and/or unexperienced problems. This demonstrates that the farmer-managed system is facing difficulty brought by changes which can be solved by timely interventions at the national level and at local panchayat levels. This is an area where future planners must give serious thoughts to issues such as national forestry management, watershed management, and migration.

4. The farmers' reason for participation in the irrigation system is the interest in growing more crops. They are willing to try new crops if irrigation water is available. BLGWP should capitalize on this aspect in order to bring more farmers' participation within its system. According to the farmers' opinion and our discussion with the different groups during the field study, it was observed that farmers/users give priority to Chhattis Mauja water because it is richer in fertilizing elements whereas the ground water is devoid of them. The team also observed that the Chhattis Mauja system is able to provide water for summer paddy cultivation only. In order to make farmers' participation more forthcoming BLGWP management should encourage farmers/users to diversify their crops by giving different incentives such as pro-rata reduction in water charges for the use of water for crops other than summer paddy, free distribution of improved seeds, and free small farming consultancy which would teach farmers improved agricultural practices.

5. The failure of government policy to understand the O&M practices of farmer-managed irrigation systems have made it difficult to obtain forest products for system maintenance, and consequently it has led to increase in the man-days required for the maintenance of the system. The government forestry policy should support the farmer-managed irrigation system by guaranteeing that the forest in the nearby area be opened to community management and the area protected and promoted. This will encourage the farmers/users to work in the farmer-managed system while it will help the user management system reduce the involvement of man-days in the O&M.

6. The increasing trend of payment of cash fines is not favorable to the user management system. The majority of the farmers are in favor of labor contributions and if the cash contribution practice is encouraged, the user management system may come to the same fate as that of BLGWP which is able neither to collect water charges nor to involve the farmers/users in the O&M.

7. The Bhairahawa-Lumbini Ground Water Project should be prepared to work in tandem with the water users' committees and more actively involve them in the decision-making process.

In this context we recommend that BLGWP synchronize both the systems' modes of operation by forming a committee from the managers of both the systems which will coordinate on the issues relating to water allocation and participation. The committee will act as an advisory committee to BLGWP. In order to pool diverse experiences the committee should be chaired by a representative from the Chhattia Mauja system.



8. In order to mobilize **farmers'/users'** participation in the RLGWP system the RLGWP management should consider invoking the **water** users in the repair and maintenance of the system **by** having them contribute labor instead of raising water charges. The **farmers/users** are also willing to contribute labor.