

**Transfer of Management to Water Users
in Stages I & II of the
Bhairawa-Lumbini Groundwater Irrigation Project in Nepal¹**

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INTRODUCTION

THE SUBJECT OF this paper is the transfer of the management of a group of deep tube wells to their users. The paper describes the approach and methodology applied in the Bhairawa-Lumbini Groundwater Irrigation Project (BLGWP) in Nepal, and what actually transpired in the process of transferring management from the Project Authority (PA) to their users.

BLGWP is still in progress. It is being implemented by the Department of Irrigation (DOI), Ministry of Water Resources (MWR) of the Government of Nepal (GON). The project is financed by the World Bank (WB). The consultant for the project, Tahal Consulting Engineers Ltd., assisted the DOI to design and construct the works and has been active in developing and applying the farmer participation concept in the project.

The irrigation systems were designed by engineers working within a traditional project framework. Until 1989, design was done without any farmer participation.

The major objectives of management transfer were to set the foundation for effective management of the irrigation units after project completion and to relieve the government of a cost which rightly should be borne by the users. The transfer process was based on a concept that included the following principles:

- With the transfer of management, the water users' group (WUG) would have to cover all costs of operation and maintenance of their deep tube well (DTW).
- Sustainability was a major objective. The purpose of management transfer was not limited to disengagement or to cost sharing. The PA wished to assure that the DTWs could continue as going concerns after conclusion of the transfer process.
- Transfer had to be total. After conclusion of the transfer, no government authority was to retain any role as an intermediary or as a provider of services for the management of the DTWs. Upon completion of the process each unit should be a farmer-managed irrigation system (FMIS).
- The PA would not impose fairness or equitability among the farmers in a WUG. This was seen as an issue internal to the WUG. Intervention by the PA is not sustainable as the PA is destined to be liquidated upon conclusion of development.
- The PA would promote administrative systems fostering transparency to provide WUG members instruments of control.

Up to the time of transfer, water in unlimited quantity was available free of charge to any farmer who requested it. The only cost was a flat rate water tax unrelated to actual consumption, which was collected by the Land Revenue Department. As this would obviously change after transfer, the plan anticipated some opposition by the farmers. It included incentives and much persuasion. It allowed time for internal negotiation among the farmers.

Management transfer met with stronger and better organized opposition than originally expected and with problems from unanticipated directions. A number of events complicated the process somewhat, requiring revisions to the original plan. While the process has not yet been completed, it is not too early to say that it has been successful in achieving its objectives.

This paper gives some background on the people and the district, the history of the project, the planned transfer process and describes what transpired in the course of the transfer. Finally, conclusions from the experience are

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presented. This paper does not discuss the new units now being developed under a demand-driven, farmer-participation process.

DESCRIPTION AND HISTORY OF THE BHAIRAWA-LUMBINI GROUNDWATER IRRIGATION PROJECT

Background

The Bhairawa-Lumbini area is located in the terai of Nepal about 220 km southwest of Kathmandu, adjacent to the border with India. Data on the area and its people from the Socio Economic Survey (Tahal 1992) carried out in September 1991 are given below. At the time of the study, the sample had enjoyed water service for at least two years and some for over six years.

- Rainfall in the area varies from 1,200 mm per year in the south to 2,500 mm in the north. About 90 percent of the rainfall occurs between mid June and September.
- The population is heterogeneous, consisting of various tribes and castes.
- Average household size is almost 9 persons per household.
- The overall literacy rate is 47 percent and is positively correlated with farm size. Thirty two percent of the population have only primary education.
- Average landholding is 1.9 ha, with 97 percent of the units owner-operated.
- Seventy five percent of the land is irrigated; sixty nine percent of the total area is irrigated by the DTWs.
- In the monsoon season 92 percent of the land is under rice, with the rest under vegetables or maize. In the rabi season wheat covers 26 percent, oil crops and pulses cover some 14 percent each. Vegetables and potatoes account for the rest.
- Cropping intensity averages 164 percent.
- Yields reported on irrigated lands are 16 percent to 55 percent higher than those on nonirrigated lands.

BLGWP is a World Bank-financed project. It was first appraised by the WB in late 1976 and design began in 1977. The plan for the project called for the construction of 64 irrigation units utilizing the groundwater in the region. The success of Stage I led to an extension of the WB loan into Stage II in 1982, for another 38 units. A feasibility study in 1990 led to a new WB loan for Stage III to finance another 78 irrigation units. At completion by the year 2000, a total of some 180 DTWs will be operational. Over 14,000 families farming about 22,000 ha will be served by DTWs in the area.

BLGWP has already installed all 64 DTWs in the Stage I area, all of which are operational. These came on line between 1982 and 1988. Of the 38 DTWs in the Stage II area 16 have been operational since the end of 1991. Of the 78 DTWs planned for Stage III, 21 WUGs are already in various stages of organization. Stage III is being developed with the full participation of the farmers.

The Irrigation Units

A DTW irrigation unit consists of a deep tube well, a pump and its distribution system. Each DTW irrigates an area of about 120 ha. The median irrigated landholding in the project area is about 1.5 ha, usually consisting of 4 to 6 scattered plots. Each DTW serves about 80 families. The pumps in BLGWP are all operated by electric power. Each irrigation unit is independent, neither receiving water from nor supplying water to any other unit. Sites were chosen on the basis of physical-engineering considerations only: topography, soil quality, etc. Depths of wells run from 120 m to 200 m.

The distribution system in Stage I consists of open channels, which are lined for only about 35 percent of their length. The units in Stage I suffer from high water losses along the earthen unlined sections, resulting in poor delivery to those at the tail end of the canals. Due to this experience, distribution in Stage II was redesigned. It consists of PVC pipes buried about one meter below the surface. This prevents the losses due to seepage which

plagued Stage I and also has the advantage that it takes up no land and requires no maintenance. A Stage II DTW consists of three to four loops of underground pipe; the majority contain four loops.

Outlets are located along the open canal or outlet pipes in the case of underground pipes. In both cases, crops are irrigated through open field channels. Area per turnout in Stage I was about 5 ha; in Stage II this was reduced to 2.5 ha.

DTW construction requires special equipment to drill the deep boreholes. The purchase and installation of the pumps, motors, electrical installations and pipes represent the bulk of the development costs. The value of unskilled labor in the DTW development and construction is around 5 percent (Tahal 1989).

In operation, maintenance and repair, the unskilled labor element is again almost negligible. The bulk of the costs is for electricity and for a pump operator's (PO) salary in operation, while repair and maintenance, skilled labor, spare parts and materials account for almost all of the other costs.

In construction, in operation and in maintenance DTWs are highly technified and require special skills and special equipment.

Calculations have shown that costs of operation and maintenance and repair (M&R) should not exceed US\$50 per ha when a DTW unit is used intensively. Of this US\$40 are for operation (electricity and pump operator's salary) and US\$10 for M&R (Tahal 1989).

Each DTW serves an organized water users' group (WUG). A WUG consists of all the irrigators served by a DTW. Its officers form the Executive Committee which is subdivided into loops and outlet groups each with its leader. Each outlet group is organized to rotate and distribute its water among the plot owners in the group.

Water Tax

The original plan in Stage I called for payment of a water tax by the farmers who own land in the command area (CA). The sum fixed was NR200 per ha of land in the irrigation CA. This remained unchanged from 1987/88 when it was first levied, until 1990/91 when it was raised to NR400. In 1987/88, the tax was the equivalent of about US\$9.50 at the official rate of exchange. The increase raised it to about US\$11.50. The tax was paid by 69 percent of the Stage I farmers at most, although in some WUGs, as many as 95 percent paid. Many farmers refused to pay complaining that they did not in practice receive water because of water losses along the unlined canals or because of inappropriate location of the outlets. Others maintained that they simply had no interest in the groundwater system and were content to use only the water that they diverted from the river.

At the time of the water tax increase, a concerted attempt was made to increase the rate of collection. Inspectors went to fields to review farmers' complaints and found that many did indeed have legitimate grievances. Some lands were struck from the water tax rolls. For those who received water on only part of their lands, the tax was adjusted accordingly.

Farmer Participation

Stage I had no farmer participation component and no cost-sharing arrangements. It was designed and implemented in the traditional way with all decisions taken by engineers employed by the BLGWP. Villagers were advised that a DTW would be installed on their land, with the location determined by the PA. All investment costs and until 1992 all operating and M&R costs were borne by the PA. Pump operators were employed by the PA and M&R was carried out exclusively by PA staff using PA equipment. In Stage I where the last DTW was installed in 1988, unlimited free water was available for at least 4 years before any type of cost sharing was instituted.

The participatory concept in the BLGWP was developed in 1989 in the course of planning Stage III. At this time, Stage I was already complete. Stage II was at an advanced phase of implementation. Virtually all 38 units had already been designed and the construction of 16 DTW was almost complete.

The farmer participation concept developed at that time envisaged two processes: one for the areas already under irrigation and another for new areas (Tahal 1989). Elements of farmer participation were introduced into Stage II to the extent practical, among the future users of those DTWs not yet constructed. Stage III is based completely on farmer participation principles and development is driven only by their demand.

It merits mention that there are major differences between management of DTWs and surface water (SW) irrigation systems. The major differences lie in the large cash expenditures in DTWs as against farmers' own labor in SW, and in the need for highly skilled labor and the availability of spare parts for M&R of DTWs (see The Irrigation Units above). These costs are all cash and out of pocket; farmers' labor cannot be substituted for them. (For a broader discussion on this subject see Olin 1990 & 1992).

Increased income directly attributable to the DTW from higher yields per crop, from greater intensity of land use and from a transfer to higher value crops leaves the farmer with a cash income of about US\$254 per ha (Tahal 1993). This is more than sufficient to cover costs of operation and maintenance and repair.

Farmer Satisfaction with the DTWs

The socioeconomic survey (Tahal 1992) inquired into farmer utilization and satisfaction with the DTWs:

- Ninety eight percent reported using the DTW while 2 percent reported using only other sources. Forty four percent reported some conjunctive use of DTW with surface sources. 87 percent of those interviewed reported receiving water at least once a week.
- Forty five percent were satisfied with the DTW. Seventy three percent of those who were dissatisfied gave as the reason for their dissatisfaction that they did not receive sufficient water.
- Eighty four percent of the farmers surveyed reported that they had benefited from the project. Twenty nine percent of those who benefited reported that the main benefit was the roads and electricity. The remainder gave agriculture-related benefits (winter crops possible, increased production). Fifty nine percent perceived an improvement in their standard of living.
- In this pre-takeover stage 70 percent of the farmers reported that they had never attended a WUG meeting.

PLAN FOR DTW MANAGEMENT TRANSFER

Organization

To implement the takeover program and the Stage II and III farmer participation program a Farmer Organization Division (FOD) was established in the PA. The FOD consists of a Division Chief with association organizers (AO) and AO supervisors. The responsibilities of the FOD are to 1) promote the takeover of completed DTWs by WUGs in Stages I and II; 2) support the Stage I & II WUGs for a limited period after takeover; 3) promote the creation of new DTWs in Stage III; 4) assist in the organization of new WUGs in Stage III; 5) apply the participation concept in Stage II according to the phase reached in each incomplete DTW; 6) orient BLGWP staff in the farmer participation concept, the procedures, progress and problems; 7) develop administrative procedures for use by the WUGs; and 8) maintain a registry of WUGs.

A "Guide to Farmer Participation" (Tahal 1991) for application by the AOs was prepared with details of the various procedures involved. All AOs were trained in these procedures. The Guide was not rigid; it was clear that procedures would be revised in the course of work, as experience was gained and solutions were found to problems previously unforeseen.

Each AO was assigned to certain WUGs. Periodic meetings of all AOs were and are held. The Division Chief and the local consultant are in the field 60 percent to 80 percent of their time working with the AOs, attending WUG meetings and resolving problems as they arise.

The FOD works closely with all other divisions of the PA and is strongly supported by project management. Its undertakings to the WUGs are generally observed by PA. In the beginning, problems occasionally arose as the FOD was not always informed of decisions and actions taken by other divisions. This was primarily due to the FOD being seen as a nontechnical division which did not have to be informed of technical decisions. When problems arose because of this, forums were developed to assure greater coordination.

The Takeover Concept

The program for the 64 DTWs in Stage I and the 16 completed units of Stage II was designated the Takeover (TO) program. This term was chosen rather than the more customary handover, to emphasize the concept both to the PA staff and to the farmers. Handing over highlights the divestiture by the authorities of their role in the system. It implies 1) that the initiative is in their hands only, and 2) that the farmers must accept what is handed over to them.

This approach would have negatively influenced staff attitudes and behavior. Under "hand over" staff would perceive themselves as givers of gifts, and a gift should be accepted graciously with a smile and a thank you. A gift leaves no room for making any additional requests or demands. The PA was concerned that such staff attitudes

would arouse resentment among the farmers and more to the point, leave the farmers unprepared for their new responsibilities. "Handing over" is an illusion. The farmers have to be willing to take it over. They have to be equipped to take over. They have to be assisted to take it over.

By naming it "Takeover" the voluntary nature of the transfer process was emphasized, with all the ramifications of voluntariness. And the process was built around it.

Takeover Procedures

The takeover procedure consisted of the following basic steps:

1. General announcement of the takeover program in all WUGs..
2. Signing of agreements between WUGs and PA outlining the obligations of each.
3. Joint walkthrough of canal with WUG and PA officers and WUG requests for relocation of turnouts, etc.
4. Preparation of canal lining design.
5. Creation of a fund by WUG.
6. Programming of the canal lining and other works as required.
7. Lining of the canal.
8. Takeover by WUG.
9. Support to WUG on irrigation system management procedures.

Points (2) and (5) are critical and are prerequisites for further action by PA. The WUG must acknowledge that it understands its undertakings and formally agrees to them by signing the agreement (all members are asked to sign) and must show that it has taken actual measures (not just promises) to prove its commitment to its share of the venture.

The creation of the fund is seen as a test of commitment. By passing this test and actually creating the fund, the WUG shows that it has dealt with internal issues and resolved them and has reached the necessary level of consensus. The fund is not a contribution to development costs and no such contribution was required. An important feature of the fund is that farmers must contribute cash. A contribution in cash is required as a more rigorous test of the farmers' commitment. Contributing moneys received as a bank loan was thought to be too tepid an expression of intent and not a full assertion nor a sufficient effort. It is important to keep in mind the dearth of labor options available to DTW projects, as mentioned in the abovementioned section on The Irrigation Units.

The fund is a sum calculated as sufficient to cover the cost of electricity for six months. The PA has estimated that electricity costs are about NR300 (US\$8.00) per ha for six months' operation. Each member is required to contribute the above sum for each ha owned in the CA. This fund must be kept in a bank account.

The BLGWP does not involve itself in internal WUG issues. It does not supervise or audit any activities, although it is the business of the AO to be familiar with the officers and members, and to know the internal issues. The AOs provide support on specific (mainly administrative) issues. They may do some prodding but it is a point of policy that the WUGs must resolve their own problems.

No alternative to takeover was offered; it was either takeover or lose your irrigation. But at no time was the threat of pump removal made overtly. It was to be stated only in reply to direct questions by farmers at WUG meetings. The AOs were instructed never to threaten.

The takeover process contained as many elements of farmer participation as possible. Farmers were consulted on their irrigation needs and on problems with the existing systems. In the matter of the canal lining, walkthroughs were done by farmers together with PA staff, to inspect the entire length of the canal, to locate or relocate turnouts, and to hear problems and complaints. The WUGs would undertake to post inspectors to inspect the work of the contractors.

As a strategy, two types of WUGs were approached in the first round: those that had a good record in the use of the DTWs and in paying their water tax, and those that had a poor record. Of the latter type, there is a small number of WUGs which have fairly reliable farmer-managed surface irrigation systems which never took to the DTW,

and a few others which have suffered internal problems and have never been able to cooperate in the past. The reason for approaching the latter type was to have an example for all to see of the PA's resolve in removing the equipment when agreement was not reached. The PA did not wish to remove equipment of WUGs which it expected would ultimately come around.

Farmer Attitudes to Takeover

The need for special skills such as mechanics and electricians and for special equipment, as well as the need for cash to pay for this and for electricity were worrying to the farmers.

The problem of takeover was complicated by the farmers' lack of confidence in their own ability to manage. This lack of confidence was strongly felt by the AOs and other staff. It was an oft-raised point in free discussions: "We'll never be able to manage this!" There was a strong feeling that the equipment was complicated and that internal conflicts could not be overcome. This was one of the reasons why most WUGs preferred management by the PM.

The data of the Socio Economic Study (Tahal 1992) on this subject are instructive. Ninety two percent of respondents in Stage I stated that they preferred that the government continue to operate the DTWs. They did not believe themselves capable of overcoming the many difficulties involved in management nor of being able to finance the costs. Their perception of themselves as managers after takeover was as follows:

- Water distribution would be Better 9% Worse 48%
- Maintenance would be Better 4% Worse 88%
- Fee collection would be Better 14% Worse 50%
- Conflict resolution would be Better 7% Worse 52%

WHAT OCCURRED

A number of developments affected the implementation of the takeover program. These did not all occur at once but were spread over a period of about 18 months. They delayed implementation, introduced uncertainties into the process, obliged modifications to the plan, and necessitated frequent discussions with the WUGs and with government officials. They included:

- Pressure by the WUGs on the Government and on the Nepal Electricity Authority (NEA)
- Negotiation with the NEA (Government and PA)
- Pressure by the pump operators on the PA
- Revision of government policy
- Budget shortfalls
- Confrontation with the WUGs

In addition to the above, Nepal was in considerable turmoil during the first part of the takeover process as the struggle to reestablish democracy was in progress. This made it impossible to comply with the original schedule. While this issue is time- and place-specific and not relevant to the lessons of takeover, it did have an impact beyond simple loss of time. The WUGs were very much politicized by the struggle for democracy and the accompanying discussions and the takeover process were affected by this.

Events

Farmers in Stage I petitioned the government to withdraw the takeover scheme. The Chairmen of the WUGs met in a group and proposed continuing the water tax system. Another type of pressure was the threat of 38 WUG Chairmen to resign their positions, claiming that they were not capable of managing the DTWs. The PA staff met

with the authorities to oppose a continuation of the flat rate water tax as unsustainable and persuaded them to remain firm.

On another front, both the WUGs and the PA tried to influence the government to oblige the NEA to change the rate structure. The NEA rate structure consists of fixed and variable components. Farmers were particularly opposed to the fixed component which requires payment even when the pumps are not in operation. This would complicate their internal cost-sharing arrangements and generate a feeling of unfairness. Discussions on this subject reached high political levels. Finally, an arrangement was reached in March 1993, wherein the NEA rate for agriculture was revised. The fixed charge was reduced to NR20 per month per kw installed (from NR60) and increased to NR1.40 (US\$0.03) per kwh consumed (from NR0.95). Fixed cost is now about NR850 (US\$18.50) per month. This new structure was welcomed by the farmers.

At the same time, the PA pressured NEA to repair the electric meters. In a survey in April 1989, it was found that fully 20 percent of the meters were not operating. The NEA charges the owner of a faulty meter the full potential cost of usage; that is, the installed capacity 24 hours a day, 365 days a year. It was clear that WUGs would not suffer this, and takeover could not be implemented without first repairing the electric meters.

The impending takeover was understood as a threat by the pump operators (PO). The POs were employees of the PA and many doubted that the WUGs would rehire them after takeover. They threatened a strike against the possible loss of their livelihoods.

Policy changes occurred in the course of implementation, causing confusion and resentment among farmers. A major instance of this was the confounding of the water tax with the takeover program: in the early stages, the government wavered between increased water tax and farmer takeover and implied at one point that they were alternatives, although in fact they were not. In another example, the takeover scheme contained an offer to line the canals at no cost to farmers. The government later adopted a policy requiring the farmers to contribute a certain amount of labor. Besides angering the farmers who had been sold a different package, this caused problems in construction. There was no way at this stage, that the farmers' labor contribution could be packaged separately from the work of the contractors. Contractors had difficulty meeting their completion schedules because farmers would do their share only when they were not engaged in agricultural labors (Reguev & Tiwari 1994).

In Stage I, the idea of taking over and paying a fixed sum per ha into a fund, originally raised problems with those who were at the tail end of the canal. As tail enders of a canal which suffered large losses, they felt that they were at best unequal partners and unwilling to share costs. This was resolved by the PA undertaking to line the canals. Later, however, when the government mandated a labor contribution as the farmers' share in the investment, the head enders were opposed. They gained nothing from the additional lining and saw no reason to contribute their labor when only others would benefit.

Budgetary problems hindered progress. The Farmer Organization Division (FOD) was provided with a single vehicle. The number of AOs assigned was always less than required. At one point government cost-cutting measures resulted in a layoff of all the AOs in June 1992, at the peak of activity. They were eventually rehired under contract, but their temporary layoff was clearly detrimental to the program. The budget cuts also hampered canal lining. After efforts to convince WUGs to accept the program, it emerged that only a few canals could be lined because of budget limitations. And of these, shorter lengths than originally agreed to were completed.

Confrontation and Compromise

After considerable efforts and much negotiation over a period of about 9 months, by June 1992 only three WUGs had voluntarily signed agreements for takeover. The authorities considered at this point that the voluntary approach was not bearing fruit and decided to force the issue through confrontation. All WUGs were informed that they would have to pay their own electricity bills directly starting July 1992. Furthermore, an example was made and the pumping equipment was removed in two units which were earlier earmarked as candidates for such action.

The PA instructed the NEA to send all future electricity bills directly to the WUGs. Strictly speaking, this was simply a symbolic act: as the owner of the installed equipment and as the body which had signed an agreement with NEA, the BLGWP was responsible for all bills. Nevertheless, agreement was reached with NEA that henceforth all bills would be sent to the WUGs. Furthermore, if bills remained unpaid for more than three months electricity supply would be cut. If cut, a reconnection charge would be made and an additional charge made for reinstalling the electric meter. Ultimately, pumping equipment would be removed by the PA. The procedure was explained to the farmers.

The WUGs raised objections that the canals had not yet been lined and that water losses remained high. The high cost per volume of water and the dissatisfaction of the tail enders would make it difficult to get members to agree on internal cost-sharing arrangements. The PA agreed to subsidize the fixed electricity charge in proportion

to the unlined section of the canal, to help the WUGs overcome internal conflicts until it could complete the lining as promised.

At first, most WUGs ignored their bills. As time passed, the NEA began to disconnect electricity supply in the units which had not paid their bills. When the irrigation season began, a number of WUGs saw no choice but to collect the required sums from their members. At this point, they were obliged to pay in addition to all back bills, a reconnection fee of 25 percent of the unpaid bills. In those WUGs where the meter had been removed, they had to pay an additional charge of NR30. The situation as it developed may be seen in Table 1 below.

[Table 1. Number of WUGs Paying Electricity Bills.]

(Tahal, BLGWP Progress Reports, Various Dates)

	October 1992		March 1993		October 1993		March 1994	
	Stage I	Stage II	Stage I	Stage II	Stage I	Stage II	Stage I	Stage II
WUGs regularly paying electricity bills	-	-	28	4	52	7	54	13
WUGs that have paid at least 1 electricity bill	42	-	19	7	-	-	-	-
WUGs not paying electricity bills	20	16	13	5	8	9	6	3
WUGs with artesian flow	2	-	2	-	2	-	2	-
DTW equipment removed	-	-	2	-	2	-	2	-
TOTAL	64	16	64	16	64	16	64	16

The Situation in Stage II

The 16 DTW units in Stage II were the most problematic. The farmers in these WUGs had no previous experience with irrigation nor with the operation of an irrigation system. They had not yet developed an irrigation-based agriculture. No tradition of communication between the farmers and the PA had developed over the years as it had in Stage I, where the PA was responsible for operation.

In the course of Stage II construction, a decision was made by the PA that the DTWs would not be put into operation until the WUGs passed their test of commitment by creating a fund. When the DTWs came on line and WUGs were asked to take them over, there was no confrontation as in Stage I. Although they had expectations of irrigation--AOs had met with the farmers and agreements had been signed--it was not all that essential. They were not yet used to irrigation. There was nothing similar to the need for canal lining that existed in Stage I, which was a point for negotiation. The call for takeover did not meet with success.

However, soon after pump commissioning it became apparent that the hopes for rains were not materializing. At this point, the DTWs had not yet been operated except to test that all systems were in order.

Some farmers from the Stage II area made representations to the PA requesting that the DTWs be put into operation to help them through the drought season. The PA had two options: 1) to insist that they first create a fund (they had already signed an agreement); or 2) to operate the DTWs in a gesture of good will with no preconditions, in the hope that the farmers would subsequently organize to takeover. The PA reasoned that it would take a long time for the farmers to organize cost-sharing arrangements and to collect the funds. The pumps were put into operation without preconditions and without requiring farmers to pay for electricity. The POs resident in the WUGs were trained to operate the DTWs and were paid a salary by the PA.

Once the crisis passed, the farmers were again approached for takeover. In spite of frequent meetings initiated by the AO, very little progress was made and the PA closed down all 16 DTW units in December 1991.

At the beginning of the next season, members of a few WUGs organized to pay the electricity bills and to have the power reconnected as in Stage I. In a few units which did not succeed in getting fully organized, the POs took the initiative, in the hope of preserving their jobs in this way. They collected the sums to pay the electricity bills, kept records of who paid and drew up schemes for how much a user should pay for water service (based on tables prepared by the AOs). This worked satisfactorily for those who had contributed. The POs observed all arrangements scrupulously, not wishing to offend anyone, to show all that it could work and to assure the continuation of their jobs in the future. The POs who undertook this venture, were educated, intelligent and able to make fairly complex calculations. In one case, a table was drawn up giving the rate to be charged per minute of water service, when loops were operating: for all four loops, for three loops, for two loops or for a single loop.

In the first season of operation, many farmers were reluctant to join. Even in those WUGs which undertook their obligations, not all farmers joined. In such cases, costs were covered only by those who paid their share. In some cases, they sold water to other farmers who requested it, usually at a higher rate. In the second season, many more farmers in each of the WUGs joined up, after acknowledging the need and recognizing that management was not beyond their power, and realizing that they could, in fact, bear the cost.

THE SITUATION AFTER TAKEOVER

The takeover process is now well established and the idea of managing the DTW no longer frightens the farmers. The takeover endeavor has been a very intensive affair. There was never a dull moment. Of the 80 DTWs originally scheduled for takeover, 69 are now fully managed by their members. They are all paying their electricity bills and in several, the salaries of their POs as well. Of the remaining DTWs very intensive activity is in progress to recover and to put them on track. Five WUGs are soon to start paying for M&R. The remaining 22 DTWs in Stage II are well prepared to takeover their DTWs as soon as they become operational. The experiences of Stage I and of Stage II Phase I will not be repeated there.

WUGs are showing a great deal of caution. Farmers are required to pay in advance for water requested in most cases. The prepayment process is time-consuming. The farmer goes to the treasurer and pays for the amount of time that he wants to irrigate. He receives a chit which he brings to the PO. The latter assigns him a turn and the exact time. In some Stage I units, the pump is turned on and off for each user, allowing 15 minutes between users to assure that each receives all the water he had paid for.

In Stage II units, the process is complicated by the need to get an irrigation partner. If a partner in another loop can be found for all or part of the same time, the charge per unit of time to each is lowered. In these units, the pump is not turned off after each usage. The farmer goes to his field and opens his outlet at the appointed time. When he finishes his turn, he closes his outlet and walks up to the pumphouse to report that he has closed it. His

appearance at the pumphouse is accepted as proof that he did indeed open and close his outlet as agreed. Walking time between pumphouse and field is deducted to determine the time that the outlet was closed.

In discussions with WUG officers, only one case of water stealing was reported. The offender was fined and the offence has not recurred. In only one case was it reported that the treasurer had used WUG funds for private purposes. As soon as this was discovered, he was obliged to repay the sums. He was removed and replaced.

In April 1994, WUGs were charging their members between NR30 and NR60 per hour of pump operation, in addition to the per ha charge. Some WUGs have decided to charge members a percentage above the sum calculated to cover electricity costs, in order to build up a fund for future repairs or other activities. Some WUGs are taking advantage of the 3 percent discount offered by NEA for early payment of the electricity bill.

Farmers are very cost-conscious. They are using the pump much less than before; preliminary figures indicate less than 50 percent of project consumption, but 18 months is too short a period on which to base conclusions. Much depends on the amount of rainfall, as well as on the natural caution of users unaccustomed to out of pocket expenditures. As they become more accustomed to paying and as they begin to observe the relationship between the volume of water and their yields, they may well increase their expenditure on water. In the meantime, they are pleased to find their costs lower than forecasted.

WUGs are insisting on conjunctive use. Where other sources exist, the WUGs are insisting that surface water systems be integrated with the groundwater distribution scheme.

A clear benefit to the farmers has been the greater responsiveness of the POs. Previously, the POs were government employees. Some of these used to lock the pumphouse at the end of their shifts, leaving farmers literally high and dry. As the farmers now pay the PO's salary and as he is usually a resident of the village and occasionally the son of one of the users, he is clearly sensitive to the needs of the users and accountable to them.

WUGs are ignoring rules of good operating practice. They turn the pump off after every delivery; in Stage II they do not observe simultaneous distribution along all loops. These practices are hard on the pump, wasteful of water and costly. The AOs are trying to make them aware of these problems and to organize the distribution differently.

Where artesian flow exists, the WUG charges farmers less for this. In most cases, the flow is enough for only one farmer; if more than one wants to irrigate, the pump must be started. There are complaints that the artesian flow is not fairly distributed.

Five WUGs are soon to be required to pay for maintenance and repair (M&R). The agreement between the PA and the WUGs called for 12 months of M&R provided by the PA after takeover. The first 5 WUGs in Stage I, which have had their canals lined are at that point. M&R are still being provided by the PA. A private M&R support service is in the process of development.

Farmer interest in the workings of their WUG appears to be more active. Attendance at meetings is generally higher than what was reported in the Socio Economic Survey (see Section on Farmer Satisfaction with the DTWs). Attendance at meetings in 8 WUGs in Stage I was recorded as follows:

Table 2. Attendance at WUG Meetings.

Meeting \ DTW No. No.	12	13	17	34	44	48	55	56
Paid-Up Members	51	87	109	82	77	141	111	97
Meeting 1	21	55	55	47	47	6	28	24
Meeting 2	17	20	30	40	7	51	4	53
Meeting 3	26	14	50	35	27	44	29	18

Ignoring meetings of the executive committee alone, attendance has exceeded 50 percent of the membership in virtually all WUGs, in at least one of the last three meetings.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The management transfer process is an interaction among many groups and within many groups. It is not limited to the WUG and the PA. In the case of BLGWP, the various participants were the WUGs individually and as a group, the project management, the government as policymaker, the government as provider of budgets, the World

Bank, the Nepal Electric Authority, the contractors, and the employees of the PA. The number of possible actions and interactions among this long list indicates the potential for complications in the takeover process.

The PA had to show that it was determined to carry out the program. But its willingness to maintain a dialogue misled the WUGs into believing that the decision was not final. The WUGs did not realize that there was a time limit and refused to accept the takeover as inevitable. They believed that they could let things drag on and adopted a wait-and-see attitude. No WUG wanted to be the first to takeover and as long as the PA tolerated it, even those willing to go along, simply postponed action.

The issue of "unfairness" created difficulties. The original plan called for takeover in Stage I to be spread over a period of five years. The PA did not have the resources to carry out takeover in an orderly manner in less time than this. A DTW taken over by its members is more costly to the farmers than one managed by the PA. The proposed offer, including canal lining, was less attractive than what the farmers had been getting before. Economic rationality dictated that each WUG should want to postpone takeover as long as possible. Each WUG felt that it was unfair to pressure it to undertake a heavier cost load, while other WUGs were not so burdened. At first, the PA had no plan for burdening the others and felt that in creating one it would cause itself unnecessary organizational difficulties. In the end, obliging all to pay their own electricity bills, and so burdening everyone at once, together with a compromise on the fixed charge, was the formula that worked.

Farmers resented changes in policy and in particular changes for the worse, after some WUGs had received a better deal. Policy changes were one of the consequences of the long time allowed for takeover. Changes in midstream also made it difficult for the Farmer Organization Division (FOD) to retain its credibility.

In the BLGWP the farmers were not inclined to anticipate problems and to resolve them in advance. They faced the problems that confronted them, but were not willing to deal with those that might just go away. Farmers were willing to test the limits. They waited till their power was cut and till the meter was removed. They withheld their labor until they realized that the work would not be done for them by the contractor.

The farmers underestimated their own ability to handle new tasks and were fearful of undertaking them. They also feared that the costs would be beyond their abilities. The AOs spent much time and effort to show them that none of this was beyond them.

The WUGs needed a lot of support at every stage of the process. In a number of WUGs, they had to be helped with simple things like issuing a receipt, calculating cost shares or preparing a list of members so that it could easily be seen who had paid and who had not.

The FOD was as frank as possible, informing WUGs what to expect in terms of costs and responsibilities. It was important that they appreciate the complexity of the tasks, but equally important not to exaggerate their complexity. The AOs gave them all the information they asked for and offered information that they did not know to ask about. The PA calculated the expected operating and maintenance costs and advised the WUGs what to expect to pay per unit of area. As a strategy, the PA exaggerated the costs slightly (though not so much as to frighten them off) on the premise that they would be pleased to discover later that costs were lower than forecasted.

Mundane issues caused serious difficulty. The lack of sufficient budgets to hire enough AOs, to purchase the required number of vehicles, to purchase fuel, to maintain the vehicles, as well as to pay decent salaries to the AOs who carry a heavy burden, was detrimental to progress.

Recommendations

A large number of groups have a stake in the takeover process. This is a potential source of complication. In planning the process, the list of potential actors must be identified, their likely reactions recognized and consideration given to these in the plan.

The time allowed for reaching consensus and the likelihood of complications are directly proportional. In planning our programs we normally assume that all other things will remain equal. However, the longer the takeover period, the less likely it is that other things will remain equal. Ministers and other officials change, each with his own set of priorities; national priorities change and budgets often dry up as a result. While sufficient time to allow farmers to reach consensus is desirable, other events are likely to intervene and raise new complications. The time allotted for takeover should be relatively short.

Firmness is extremely important, but it must be mixed with a touch of reasonableness and fairness. Until the farmers understood that takeover would not be rescinded, very little progress could be made. There must be clear date targets from the start, and the WUGs must see that the PA is in earnest when such a date is targeted.

Farmers are patient. The PA has a time frame in which to complete its project and then the budget will run out. The farmers know that the PA will be gone after a while, so they feel that they can outwait it. In the case of the BLGWP, they understood that they could not outwait it [only] when the WUG faced a crisis.

Frankness and honesty in informing the WUGs what to expect in terms of costs and responsibilities were very important. They must appreciate the complexity of the tasks, but it is equally important not to overwhelm them. Calculations of expected operating and maintenance costs should be provided for the group as a whole and for individuals, under different assumptions and conditions.

Where labor is to be contributed by the farmers, it must be in complete self-contained packages. Intermixing contracted work with contributed work is a recipe for problems. The work of the WUG and that of contractor should be independent of each other. And if there is no choice, then they should be scheduled so that farmers finish their part first. Projects using farmers resources must take into consideration when these resources are available and plan around that.

The WUGs need help in administering their finances, in scheduling irrigation and recording water use by farmers in their different plots or scheduling pump operation without frequent stops and starts.

Finally, the PA must be ready to accept some adversity. You have to be ready to accept losing a few and not having it all your own way.

The major conclusion from the takeover exercise is that the need for takeover should be avoided in the future. Farmers should be involved in design and development from the outset and at no time should they be allowed to believe that they will be given handouts.

WHAT REMAINS TO BE DONE

The major tasks remaining to complete the takeover process are the following:

- Development of a private-sector maintenance and repair support service for the DTW equipment.
- Creating awareness among the WUGs of the need for preventive maintenance and of its value.
- Training and inculcating good operation practices to assure the long life of the equipment and to reduce the likelihood of breakdowns.
- Advising on operating practices which will reduce costs and time lost in reporting to the pumphouse.
- Training in DTW management for chairmen and other officers and training of pump operators.
- Advising on good management and administrative practices such as retaining reserves to cover the cost of repairs when necessary.
- The introduction of transparent financial management and recording systems that engender confidence, fairness and mutual dependence, so that members will be able and willing to cooperate and be able to determine whether the financial management is honest and efficient.

The BLGWP believes in the need for organizational support to WUGs after takeover. Support will be offered for only a given fixed time. Twelve months of support is estimated to be sufficient. We do not want to create a new type of dependency.

A Word on Private-Sector Maintenance and Support

Private-sector M&R support service is being promoted as promising long-run sustainability of DTW-based irrigation systems. The intention is to foster the establishment of such support to replace government-provided M&R services. The latter do not promise long-run sustainability. Ultimately such support is almost always withdrawn or suffers from insufficient budgets. Active assistance in the development of a private M&R support system and abstention from establishing government-run M&R systems are the essence of the concept promoted in the BLGWP.

The program focuses primarily on mechanical and electrical M&R and sets out to create a source of such M&R services.

An activist approach to the development of an M&R support system has been adopted to stimulate the private sector in this field, as the capabilities will not develop unaided. The program includes: providing information, offering training courses and disseminating the knowledge and the lessons of experience and assistance in obtaining credit. A training program [is necessary] for electricians and mechanics in order to assure a sufficient supply and to provide for competition among them. Accreditation of workshops satisfying requirements for M&R will also be done.

Handbooks on routine mechanical and electrical maintenance and on civil maintenance that can be handled directly by the WUGs or the pump operator are being prepared.

While promoting the development of the M&R support system, it is recognized that many WUGs may not observe the prescribed procedures without the necessary coaching. Therefore, information on the importance of preventive maintenance and its benefits will be continuously disseminated to WUGs through an intensive program of meetings until project completion in the year 1999. For a broader discussion on this subject see *The Sustainability of Groundwater Farmer Managed Irrigation Systems* (Olin forthcoming).

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Abbreviations

AO	Association Organizer	PA	Project Authority
BLGWP	Bhairawa-Lumbini Groundwater Irrigation Project	PM	Project Manager
CA	Command Area	PO	Pump Operator
DOI	Department of Irrigation	SW	Surface Water
DTW	Deep Tube Well	WB	World Bank
FMIS	Farmer-Managed Irrigation System	WUA	Water Users Association
FOD	Farmer Organization Division	WUG	Water Users' Group
GON	Government of Nepal		
M&R	Maintenance and Repair		
MWR	Ministry of Water Resources		
NEA	Nepal Electricity Authority		
NR	Nepal Rupee		