Sub-theme 7: Subsidiarity and Participation in Water Management

Governance of Water Users' Associations in Nepal

by S E Howarth[1], U N Parajuli[2], J R Baral[3], G A Nott[1], D R Gautam[3], Menuka KC[3], B R Adhikari[2], R K Jha[3], S Paudyal[3]

Abstract

There is a major emphasis on participatory irrigation management world-wide. This is widely seen as fundamental to improving the performance and sustainability of irrigation, and it has been incorporated in the water resources policies of many countries. Despite this effort and some significant achievements over the past two decades, progress has been less than had been anticipated.

This paper is based on research into irrigation on about 20 schemes in Nepal since 2000, with detailed studies on one modern jointly managed scheme (Sunsari Morang - SMIP) and one traditional farmer managed scheme (Kamala Uttarabahini). In the case of SMIP, the main system was designed for centralised management, involving operation of many control structures, but a simple on-off system was adopted to avoid adjustments at tertiary level. This has many advantages but it differs from the system followed on indigenous irrigation in Nepal, where the main system is run on a proportional basis but with flexible operation at tertiary level. Further, it is not followed in practice and users make many informal adjustments, which compromise the overall performance. This study has analysed performance of these two types of system, and identified the key features that influence whether management can be effectively devolved.

In accordance with the irrigation policy, water users' associations (WUAs) were set up on these projects. These users were not involved in preparing the policy and do not fully agree with it – particularly as one aim is to transfer costs to the users – but they do agree with the concept of participation in water management. The format of WUAs is standardised and does not correspond to traditional practice - which is simpler, albeit less democratic. However, new WUAs are rarely as representative as desired. Even the formal democratic requirements are rarely acted on – there are provisions for regular elections and for participation by women but these are not enforced. These would not necessarily lead to effective representation of excluded groups, since they are reluctant to talk openly in public meetings. Other groups, such as some categories of tenant, are systematically excluded. Sharecroppers, for example, are not eligible to be members even in places where they form a large proportion of the users. In practice, they are often involved on an informal basis since it is they rather than their landlords who are most dependent on irrigation.

The performance of these WUAs depends on many factors, including:

- Unrepresentative WUAs, often building on modern political structures or dominated by local elites;
- Lack of understanding of the function of WUAs, or an unwillingness to accept this role, combined with unrealistic expectations for user involvement on supplementary irrigation schemes, where benefits are small;
- Ill-defined functions or division of responsibilities between users and government;
- Persistent under-funding for O&M and weak systems for collecting and managing resources;
- Little relationship between management performance and project benefits;
- Inability or unwillingness of WUAs to work effectively until large-scale problems are resolved;
- Inadequate systems for conflict management and inability to enforce them, often ignoring local norms;
- Lack of skills and interests in community management of natural resources, and strength of leadership;
- lack of transparency in procedures, particularly financial management and monitoring water distribution; and
- poor communications between committees and general membership, and with other stakeholders

Some of these issues are outside the scope of the WUA, but many can be addressed by helping the users setting up organisations that are representative and meet their specific interests. This will require appropriate support, but they should not be coerced into a standard format. Their requirements are very specific to individual schemes or parts of schemes, to suit their socio-physical conditions, and it is not possible to regard a WUA as a homogeneous unit.

This research has analysed these issues through detailed participatory studies on two projects, in order to:

- Engage with all categories of water users, including representatives from all parts of the system, male and female, direct and indirect users, landowners and landless;
- Understand the problems of the system from the perspective of these users, and in the context of their livelihoods, which involve many other issues as well as irrigated agriculture; and
- Resolve these issues through water users' schools, which will enable a wide range of users to discuss these problems and develop potential solutions. These schools are run for one morning per week throughout a cropping season so that participants can work through problems as they occur and develop solutions.

In conclusion, it appears possible to improve management by increasing participation by water users, but only if realistic objectives are set and WUAs are set up in accordance with their own needs and interests. They should not be seen as a universal solution.

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1 Introduction

There is a major emphasis on participatory irrigation management world-wide. This is widely seen as fundamental to improving the performance and sustainability of irrigation, and it has been incorporated in the water resources policies of many countries. Despite this effort and some significant achievements over the past two decades, progress has been less than had been anticipated.

This paper describes the situation in Nepal, on the basis of detailed studies of one modern jointly managed scheme (Sunsari Morang - SMIP) and one traditional farmer managed scheme (Kamala Uttarbahini - KUIS), supported by data from a rapid review of about 20 schemes in Nepal. Pilot interventions aimed at strengthening the local institutions responsible for management are now in progress through this action research study. A central element in this undertaking is getting the active involvement of all water users in the development of these approaches, working with them to indentify problems, derive and implement solutions, and monitor progress. This work is being undertaken as part of the DFID knowledge and research programme.

In accordance with the national irrigation policy, water users' associations (WUAs) have been set up on these projects, or are in the process of being established. These users were not involved in preparing the policy and may not fully agree with it – particularly as one aim is to transfer costs and maintenance responsibilities to the users – but many do agree with the concept of participation in water management and recognize that it can have significant benefits for them.

2 Review of irrigation systems in Nepal

2.1 Types of system

Most irrigation in Nepal is small-scale and farmer-managed: such projects may be up 10,000 ha but are generally much smaller. These projects have been much studied recently and are widely considered to be very effective (Lam, 1998). However there are large areas that cannot be developed on traditional lines,so there has been considerable effort spent on developing large-scale modern irrigation over the past 50 years or so. Until recently this 'modern' irrigation often replaced older indigenous irrigation in parts of the command area. Not surprisingly this has been much criticised (Dixit, 1999) as it destroyed a functioning scheme for a theoretical but sometimes unrealised benefit of improving performance or equity. Although it has many other advantages, traditional irrigation may not be equitable (Pradhan, 2000).

About two thirds of all irrigation in Nepal is in small farmer-managed schemes of less than 500 ha. The remaining third is served by about 90 projects that individually irrigate more than 500 ha in area covering a total of almost 300,000 ha (Table 2.1). These large schemes are the focus of this study (Mott MacDonald, 2002), and those reviewed are listed in Table 2.2.

Table 2.1: Large Irrigation Schemes in Nepal

Size (ha)	Nr	Total irrigated area (ha)	Management
>10,000	7	150,000	8% Farmer managed
5,000-10,000	8	50,000	20% Farmer managed
2,000-5,000	11	30,000	60% Farmer managed
1,000-2,000	16	20,000	60% Farmer managed
500-1,000	50	30,000	90% Farmer managed

Source Mott MacDonald (2002)

There have been many stages of development of irrigation, with both government and private investment, but they can now be divided into two broad categories – farmer-managed (FMIS) and joint-managed (JM). A few schemes are officially agency-managed (AMIS), but the farmers are informally involved in management. WUAs have been very widely promoted and have been established at some stage on almost all schemes where there has been any investment by the Government or other external agencies.

(i) Agency and Joint Managed Schemes (AMIS and JM)

These systems were designed for centralised management with resultant difficulties in making the management both decentralised and less technically demanding (for example to control flows or water levels). It has proved difficult to get sufficient awareness of the reasons for transferring management and agreement with the objectives of irrigation management transfer (IMT). Consequently, the process of setting up joint-management agreements has been slow. As

some of these schemes are large, a complex structure of WUAs is needed. This is difficult to manage as there are so many instituional, social and technical interfaces. Farmers are more likely to rely on the Department of Irrigation (DOI) to resolve their problems or cover financial shortfalls, so local government is less involved in these schemes than it is in farmer-managed irrigation. Yet control of WUAs is keenly contested by local 'influentials' both because they seek to be involved in the initial rehabilitation, and because it is important for developing a local power base – leadership of a WUA has a wider significance than irrigation. WUAs do not focus on long-term management and few have achieved a real commitment to it. While WUAs may take decisions on matters they expect others to carry out, they rarely act on issues that they should implement themselves.

Table 2.2: Projects Reviewed

Project	Management type	Area	Date of construction / rehabilitation
Kankai	AMIS – partial JM	7,000	1990
Bagmati	Under development for JM	37,000	On-going
Hardinath	AMIS – in process of handover	2,000	1968/2002
Jhaj	AMIS (WUAs recently set up, no JM agreement yet)	2,000	1965
Tilawe	AMIS (WUAs set up but lapsed)	5,600	1968/1994
Begnas	AMIS (WUAs recently set up, no JM agreement yet)	600	1990
Bijaypur	AMIS (WUAs recently set up, no JM agreement yet)	1,300	1966/1990
Sunsari Morang I	Joint Managed	9,750	1975/1986
Sunsari Morang II	Joint Managed	16,650	1975/1995
Khageri	Joint Managed	2,850	1969/1998
West Gandak	Full handover, but under review	10,300	1975/1996
Marchwar	JM – lift irrigation	2,950	1996
Sundari	FMIS	700	1995
Bighi	FMIS	1,000	1998
Kamala	FMIS	500	1992
Aruwa	FMIS	800	1998
Imriti	FMIS	700	1994
Siyari	FMIS	400	1980
Tika Bhairab	FMIS	450	1978
Mahadev *khola*	FMIS	250	1978/1997
Rajapur	FMIS	12,000	2000

Source Mott MacDonald (2002)

Nevertheless, although there is little evidence of WUAs managing canals larger than tertiary canals (say up to 100 ha), users can still have an effective input into higher level management, particularly in planning O&M. Probably the best performance of joint management is at Khageri where WUAs manage 250 ha secondary canals. Attempts to impose distribution systems on users, such as by the 'structured system' at SMIP have not succeeded as the users do not understand the basis for this system. WUAs have mainly focused on managing water – it is rare for them even to attempt to work as multi-purpose agricultural institutions, despite the clear benefits if they succeeded in diversifying. Unfortunately, the few attempts to date in diversifying WUAs have not been sustained (Pradhan, 2002).

Many of these schemes have a relatively low demand for irrigation, since they are primarily for supplementary irrigation (particularly at the time of paddy land preparation). There is little incentive for farmers to invest in developing cooperative arrangements as the benefits are so low. In such a situation, management methods which are less demanding of community cooperation are needed – setting up effective, sustainable cooperation has high 'costs'. It is not surprising that the best-managed schemes have significant areas of dry season irrigation (spring paddy and vegetables) such as Kankai, parts of Sunsari Morang and Khageri in the *tarai* and Bijaypur in the hills. Here the economic benefits of co-operation, involvement and investment (not necessarily financial) is likely to be greater. There are relatively few schemes where there is sufficient water for this, but these are most likely to respond to participatory irrigation management.

(ii) Farmer-managed schemes (FMIS)

All of the schemes studied are old but most have been rehabilitated in the last 10 years. As might be expected, they are more intensively farmed than the agency-managed systems as they developed in response to a need for irrigation,

although they are generally on small rivers with insufficient flow for spring rice. Their layout is well suited to decentralised management of essentially independent units; and management relies on labour (particularly off-season labour at times of limited alternative employment opportunities) and local materials, rather than cash.

There is a distinction between cooperative and autocratic types of management. The former are more common on the smaller schemes (particularly in the hills) where old communities developed and continue to manage the project. The *tarai* was settled by giving large land grants (*birta*) to favoured individuals; this land was developed and farmed by share croppers but all decisions were taken by the *jamindar* (landlord). Following land reform this system has been abolished and some of the irrigation has collapsed or is under-performing. There are no established communities involved in the systems and there is little sense of 'ownership'. Small farmers may be unable to make a satisfactory livelihood from irrigated agriculture and thus work as migrant labourers rather than invest in cooperative management.

WUAs are only set up where they are required for some interaction with the Government – usually for rehabilitation. This rehabilitation remains the focus of their activities and it is difficult to strengthen sufficiently to take on a larger role. Often they do not even formally take over the scheme on completion of the rehabilitation, so the WUA remains in limbo. Management often reverts to the traditional system, but they may lack the skills or resources for maintaining complex modern structures – particularly if separate schemes are combined. Even if schemes were not formally combined, developments on one project can influence another - traditional weirs were leaky, letting water pass to downstream users but modern structures prevent this. This can create new conflicts between adjacent schemes, for which there is no forum for resolution.

Local Government has some involvement in irrigation, and Village Development Committees (VDCs) are often involved directly or indirectly in management. Their role is not yet clear, as Local Governance Act has not been fully implemented in practice and the local bodies were dissolved in July 2002 without setting a date for elections. This is an issue which needs clarification (and which applies to many sectors as well as irrigation)

2.2 Relation between infrastructure and management

Irrigation schemes are designed to suit a particular management arrangement. Changes in management can logically be expected to need a change in infrastructure. For example, agency-managed schemes are typically designed in a very hierarchical way, with considerable flexibility of water control at higher levels in the system but proportionate distribution at lower levels. This is seen in the 'structured system' adopted at SMIP (see below). As irrigation requirements do vary significantly on a local level, it is difficult to impose the rigid 'structured' system despite its simplicity. The users make many informal adjustments (for which appropriate infrastructure does not exist, so they cause some damage also). This compromises the overall performance of the system. Other schemes were designed on the assumption that flexibility is needed throughout (eg Kankai and Bagmati), but this results in a very large number of gated structures and high maintenance costs which the WUA can rarely afford.

Farmer-managed irrigation, such as Kamala, however, is typically the reverse, with rigidity in the main system which serves diverse groups of people and flexibility at lower levels where farmers are able to work closely together and trust each other to make adjustments to suit individual needs. This approach is adopted on large farmer-managed irrigation schemes, such as Rajapur (12,000 ha), which are divided for management purposes into much smaller autonomous branch systems (Howarth & Lal, 2002).

Transferring management responsibilities should be accompanied by a careful review of the infrastructure – what is required is not necessarily rehabilitation, which is often just a carrot to help persuade farmers to take it over, but redesign to ensure that it is consistent with the new management system. There should also be a maintenance plan to ensure that it can be sustained (both technically and financially).

2.3 Performance of WUAs and Implications for Sustainable Management

There has been considerable difficulty in setting up effective irrigation management arrangements in Nepal. Although there are many successful farmer-managed irrigation schemes, it is difficult to use this experience on new irrigation schemes. Many people do not trust WUAs to operate honestly and transparently, and they consider them to be less democratic than local government. WUAs have been externally promoted, usually as a requirement for a government-financed rehabilitation programme, mainly over the last 10 years. Thye have rarely participated in a fullly accounrtable way even for this activity, and WUA committee members have shown little if any commitment to taking up their full responsibilities. Equally institutional development has been given less emphasis than physical rehabilitation by the government.

There has been little awareness amongst users of the reasons for setting up WUAs - lack of understanding of the function of WUAs, an unwillingness to accept this role, and unrealistic expectations by government for user involvement - all contribute to this. Most training has been given to committee members and even they have been given little long-term support so few continue to function effectively after the end of the project. Few farmers want to take over management in the belief that they can improve the situation and in fact there is little relationship between management performance and project benefits although they are sometimes able to improve the situations, particularly where there is strong leadership.

Irrigation is very expensive and heavily subsidised (in practice by almost 100%) and yet severely under-funded. The returns to irrigation are often small compared to the investment. This gives a strong disincentive to taking over responsibilities unless the subsidies are continued. WUAs have weak systems for collecting and managing the limited

local resources available, and limited authority to do so. Although there are common demands for WUAs to be given greater legal authority for this task, this would create the risk of further abuse and misappropriation of funds by local elites.

Users expect DOI to manage at least the headworks and preferably the main canals – this would make DOI responsible for providing water into the canals, and WUAs are usually unable to work effectively until these large-scale problems are resolved. The larger the scheme the more important this issue is.

Sustainable WUAs depend on a totally democratic environment, with all stakeholders committed to transparency and the common good. This is rarely, if ever, achieved in practice, but issues which are particularly important include:

- *Clarity of roles* – definition and awareness of objectives, roles, rights and responsibilities; the appropriateness of these to local situation (socio-economic situation, type of agriculture, type/scale of infrastructure, water stress, etc); distinction between decision-making and administrative tasks, relationships and communications with other organisations (including higher and lower levels of irrigation management).
- *Participation* – the extent to which the users participated in formulation of policy and the application of policy to local situation, their participation in the management institutions, how comprehensive this is for different sections of the community and different categories of users, and how well this reflects their interests. They are often unrepresentative WUAs, building more on modern political structures or control by local elites than on traditional community management arrangements.
- *Autonomy* – the ability to make independent decisions, collect and manage sufficient resources, appoint staff, establish and enforce rules, resolve conflicts (in accordance with local norms), and act in their own interests etc, rather than depend on external sources or influences.
- *Accountability* – accountability of the organisation to its members, rights of appeal, and the transparency of procedures for ensuring this. How is it regulated and audited.
- *Transparency* – of information (including an effective communication system), procedures, finances, distribution of water to an agreed schedule.

It is quite easy to state these issues in general terms, but it is clearly far more difficult to ensure that these conditions are met. The second stage of this project therefore included action research on two projects, with interventions aimed at strengthening users' organisations, with realistic objectives, and developing guidelines that can be used more widely.

3 Sunsari Morang Irrigation Project

3.1 Introduction

Sunsari Morang Irrigation Project is the largest in Nepal and was built in the 1970s with Indian assistance to irrigate 66,000 ha, using water from the perennial Kosi River. At that time only the main canals were built and there was no concept of participatory irrigation management. Command area development (ie providing a canal network down to farm level) followed on almost immediately and is now about half complete. This has been accompanied with increasing amounts of rehabilitation and completion of the original scheme, and there have been some changes in design and management philosophy. It is now established as 'structured' and 'joint-managed' system. These concepts are important to understanding performance of the project, and are described further below.

3.2 Institutional arrangements

A hierarchy of water users associations has been set up, as laid down in the National Irrigation Policy. Although broadly in accordance with Ostrom's (1992) principles, this was established in a fairly standard way. The users were not involved very effectively, and they do not appear to understand the role of the institutions clearly. Each type of canal has a corresponding type of users organisation. There are two orgnisations with responsibilities for management below the structured level - the water users committee (WUC) for the sub-secondary canal (typically 200-700 ha), and the water user groups (WUG) for watercourses (30ha). Higher-level associations have duties for co-ordination with different levels of the project authority for jointly managing the main and secondary canals. Each layer is formed of representatives from the layer below, and the hierarchy as a whole has been registered as a legal entity.

The WUAs have noble tasks of improving management of water (acquisition, allocation, distribution and drainage), resolving disputes and conflicts, mobilising resources (cash, kind and materials), and undertaking system maintenance and repair. But they appear to have done little in practice, all activities are carried out on an *ad hoc* basis (mainly on the initiative of tail-end farmers who are the first to suffer from system inefficiencies, leakage etc): the WUA are generally considered to be moribund. They have few systems or rules, and those that they do have are not acted on. Using the terminology of Uphoff and Krishna (1999), DOI focussed on promoting the institutions or structural social capital, rather than developing the shared values and norms of cognitive social capital which are necessary to make the institutions function.

The format of newly established WUAs is elaborate and does not correspond to traditional practice. The reason for this complex structure is rational and is aimed at making the WUAs democratic. In this it differs from FMIS which have very simple management arrangements and are often autocratic. However, new WUAs are rarely as representative as desired. Even the formal democratic procedures are rarely acted on – there are requirements for regular elections and for participation by women but these are not enforced. These provisions would not necessarily lead to effective

representation of excluded groups, since they are reluctant to talk openly in public meetings which are dominated (directly or otherwise) by political elites. Other groups, such as some categories of tenant, are systematically excluded. Sharecroppers, for example, are not eligible to be members even in places where they form a large proportion of the users. In practice, they are often involved on an informal basis since it is they rather than their landlords who are most dependent on irrigation.

3.3 Water distribution

SMIP was designed as a "structured irrigation system" (Perry and Albinson, 2002), which is intended to be a simple way of managing large-scale irrigation. The approach is based on a clear delineation between the part of the irrigation system that is actively managed (at various flow rates and water levels) and the part of the system that operates *either* at full supply level (with proportional division of water down to the level at which farmers rotate among their individual farms), *or* is completely shut. The point of transition is referred to as the *structured level*. The government is responsible for the actively managed part of the system down to the point of transfer, which is the head of sub-secondary canals (serving from 100 to 1,250 ha). There are no gated structures below this level – all flows are shared proportionately down to the head of the watercourses (30ha) via open channel proportional dividers. The turnouts into watercourses are fitted with adjustable proportional modules (APMs): these are intended to be fully open or fully closed, and when open should deliver water proportionate to the area irrigated even if the watercourse water level varies. The approach was introduced to SMIP at around the same time as the concepts of participatory management, although (at least in theory) it reduced the requirement for active involvement in management.

The flow into the canal system is very variable since although the intake is on a very large perennial river there is no weir and thus the level fluctuates both seasonally and diurnally due to rainfall and snow melt. This severely affects the amount of water that can be diverted into the main canal. The upper part of the irrigation system is fully gated so that the supply to each secondary canal can be controlled by DOI.

There is usually too little water for continuous supply to each secondary canal, so there is a system of rotations to ensure that each gets a supply corresponding to its irrigated area. Thus the main system above the level of interface (structuring level) needs to be fully regulated and actively managed. To cope with this situation, each sub-secondary canal was designed to receive water in alternate weeks and each watercourse for one day per week, so that each farmer would receive water once in 14 days. This schedule was intended to be very simple and predictable, with each farmer always receiving water at the same time on the same day of the week. However, it has been modified in practice as the 14 day interval is too long for rice irrigation. The sub-secondary canals now receive water for four days out of every eight – it was found to be impractical to change it to a 7 day rotation which would have ensured irrigation at fixed times for each farmer, because of the time needed for filling canals.

This 8 day cycle is the normal arrangement for the monsoon season but it has to be modified at times of greater shortage, or if the main canal has to be closed because of rainfall or sediment. Thus farmers in each block lobby to ensure that their sub-secondary canal is operated to give them more water. In such a situation, it becomes essential to have an organization to coordinate users of different sub-secondary canals and to manage water distribution between them. Thus, operation of the main and secondary canals needs to be centrally managed and co-ordinated by the agency or the main users' committee.

Central management of the main system works relatively well at SMIP at present and ensures fairly reliable and predictable flow into the sub-secondary canals, but the situation may deteriorate as larger areas are rehabilitated and competition for water increases. There are already problems of communication as it is such a large system, so that users may not be aware of the reasons for canals being closed or gates adjusted. Users are familiar with the standard schedule, but unexpected closures due to rainfall or sediment load in the river encourage farmers to steal water.

More serious problems occur at a mid-level in the system: there are major deviations from the schedule below the sub-secondary canal head. The flows into some tertiary canals may be adjusted illegally by individual users and may greatly exceed that designed, and there may be additional illegal direct outlets, so that much less water reaches the tail of the sub-secondary canal. As the sub-secondary canal is below the structured level and intended to be fully automatic, the management organization (WUC) has a limited role and is quite weak. It is thus unable to police the canal and prevent illegal offtakes and checks in the canal. Responsibilities for this are not clearly defined. Figure 3.1 indicates the flows at the head and tail of the sub-secondary canal as compared to the design discharge from which it can be seen that there is a severe shortage at the tail, despite a generally adequate supply at the head. The reverse applies at times of flood, when upstream users reject excess water – downstream users get either too little water or water at the wrong time.

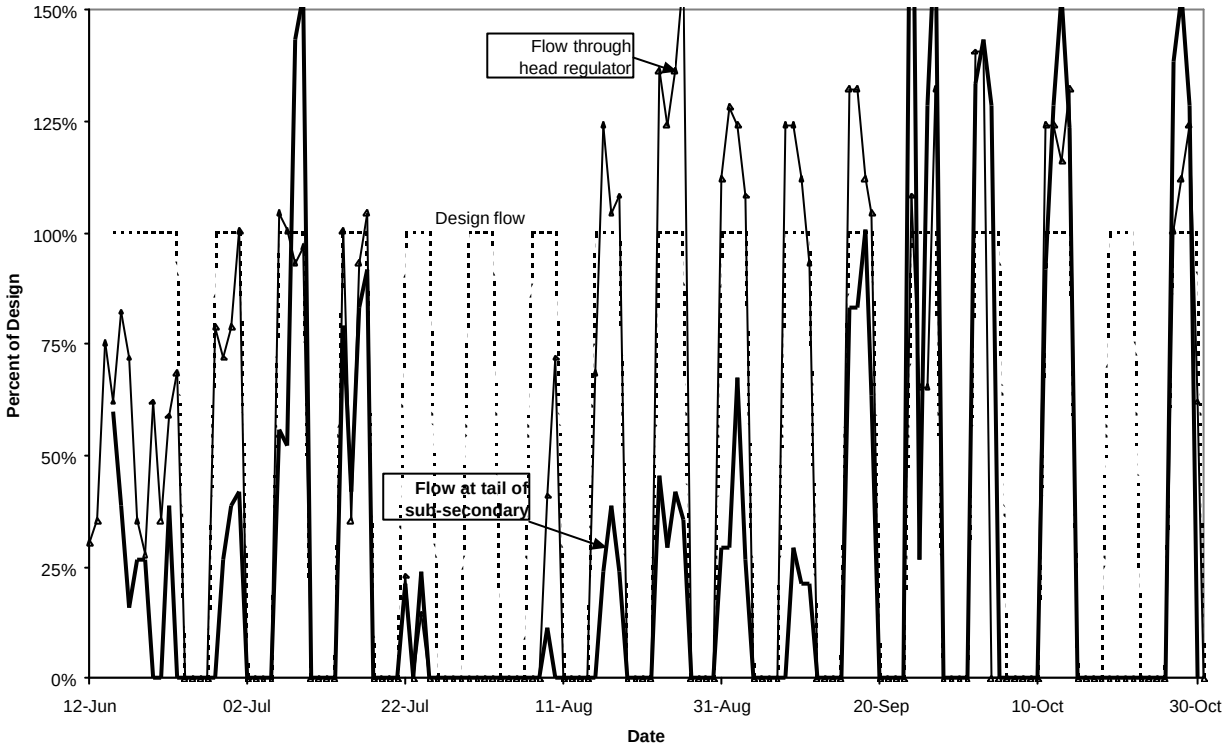
The flows into the head of the watercourses are thus not at all equitable, and some face severe water shortages. However, management within this lowest level in the system is slightly better. WUGs were set up to manage flows within a watercourse, since some active management for opening and closing the APMs. It is interesting but not surprising that, of those studied, it is the watercourses which have the greatest shortage, such as T3-4, that have developed the most effective WUGs

The structured system in Nepal aims to impose rigid schedule comparable to the *warabandi* system of NW India. Although that works well in the Punjab it is less effective in Nepal; this is partly because it is a new concept, but depends on having an absolutely fixed and regular schedule which is well-established and well-known (Berkoff, 1990). Any water theft is immediately obvious, since no interventions or variations are permitted, so it can be prevented. In

Nepal, where there is higher rainfall, the crops require flexibility in irrigation. The challenge, which has not yet been resolved, is how to achieve this and still be fair.

In practice farmers modify both the physical infrastructure and the management system to meet their local needs (Figures 3.2 to 3.4 show the changes in layout of a typical watercourse - T3-2). The simple layout was modified at construction to avoid a parallel watercourse. Further changes occurred after construction as it was found that alignment of this watercourse was very bold and cut across the drainage lines. This not only led to heavy filling for construction of the canal but it has created serious problems in maintenance. The problems were made worse by under-designing the drainage structures. As a result the tail of the watercourse was abandoned, and a new illegal direct outlet was constructed from the sub-secondary canal. This rigid design ignored both the small FMIS, which had irrigated part of this land before, and the complexities of local drainage paths (which are not always obvious on topographic maps of the scale used in design). This is very different from the approach generally adopted in FMIS, which incorporates such features in the design, and highlights the value of making use of local knowledge in design.

Figure 3.1 Canal Flows compared to Design



Parallel canals are theoretically very efficient and reduce the number of offtakes from the parent channel, but unless their use is strictly enforced they will quickly be abandoned by those who find it easier to take water directly from the main canal. Parallel channels can work well and are a common feature of FMIS, but they are associated with strictly enforced water rights and water theft are not tolerated.

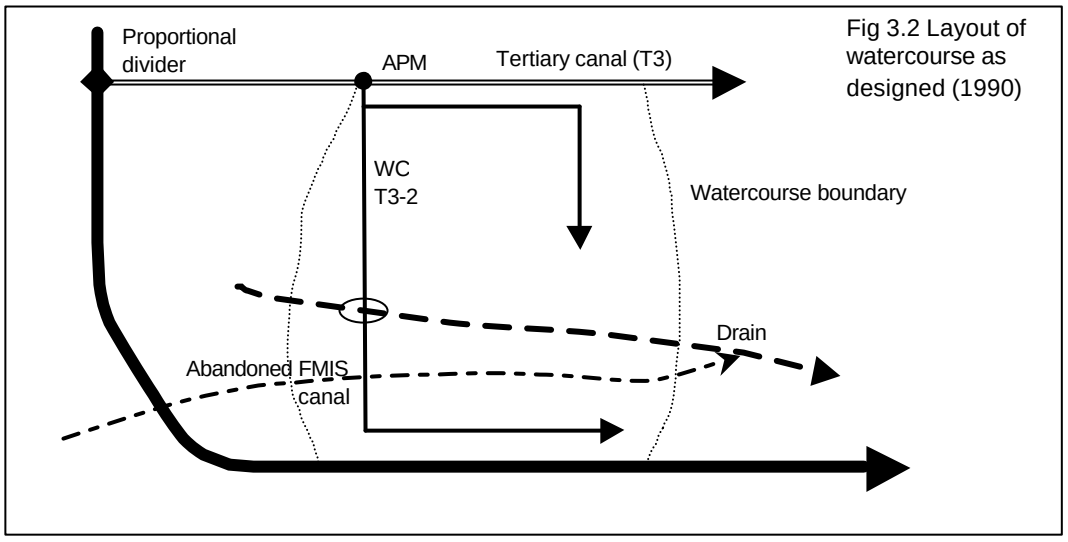


Fig 3.2 Layout of watercourse as designed (1990)

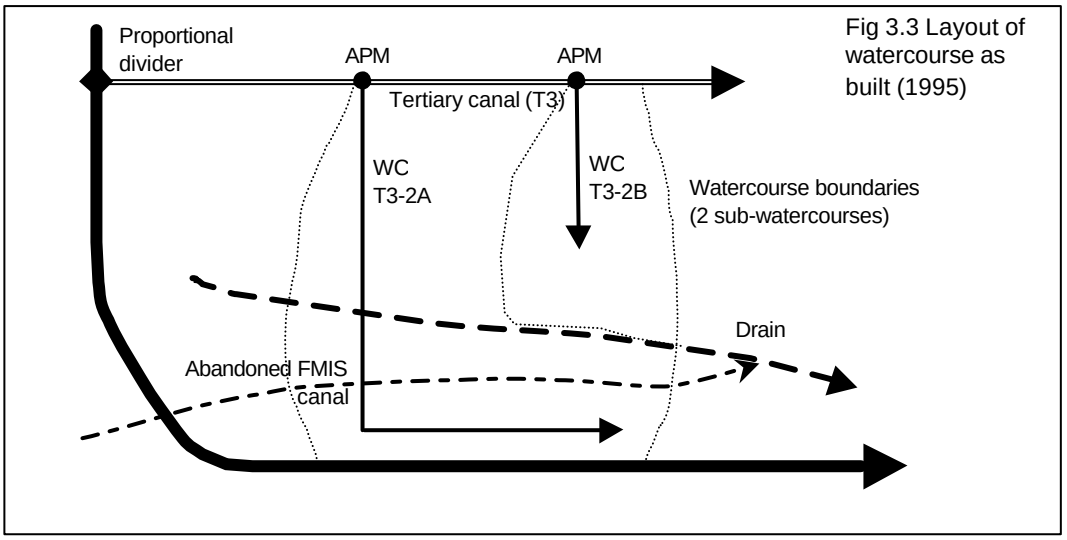


Fig 3.3 Layout of watercourse as built (1995)

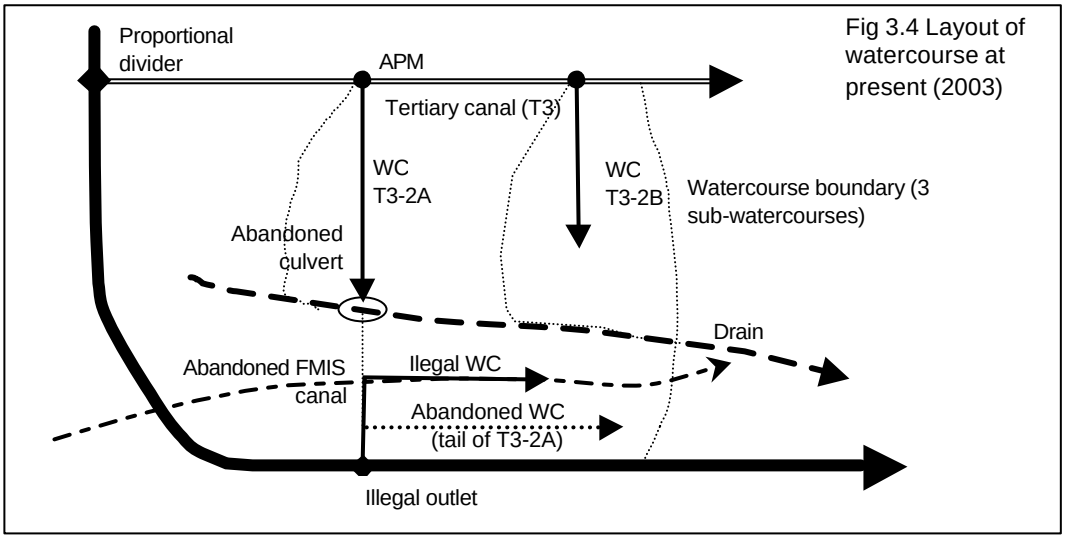


Fig 3.4 Layout of watercourse at present (2003)

Each watercourse is designed to have a small number of outlets, usually seven, which supply field channels serving 4 ha blocks. Within each 4 ha block, the farmers should construct and manage shared field channels to irrigate all land. In practice each farmer wants his own outlet, partly because the field channels have not been constructed and partly to give him direct access to water in the watercourse. Farmers have thus installed a large number of private outlets (Table 3.1).

Table 3.1 Actual numbers of field outlets as compared to the number designed.

Field Outlets	Watercourse								
	T_{2-1}	T_{2-4}	T_{2-5}	T_{3-1}	T_{3-2}	T_{3-4}	T_{5-1}	T_{5-2}	T_{5-3}
Irrigated area (ha)	42	34	29	36	41	35	23	26	35
Designed number of outlets	7	7	5	7	8	7	9	7	7
Actual number of outlets	18	12	17	13	13	22	26	23	21

4 Kamala Uttar Bahini Irrigation System

4.1 Introduction

Kamala Uttarbahini irrigation system serves about 500 ha on the edge of the *tarai* adjacent to the perennial Kamala river. It irrigates what used to be a *birta* landholding granted some 50 years ago. The land was jungle at the time, and was cleared and irrigated by workers brought in by the landlord. Through a gradual process of land reform, immigration and settlement, it is now a densely populated smallholder irrigation system. Irrigation institutions have evolved to manage the system through these fundamental changes. At first they were informal but had strong powers to manage the system and enforce its rules. More recently they have been formalised and registered but paradoxically have lost some of their power to control the system. Nevertheless it continues to function and most farmers are actively involved in and benefit from the system. It should be noted that the analysis given below is mainly based on a study of one large branch

canal (B5). A much larger irrigation system (25,000 ha) has been developed over the past 30 years by the government immediately downstream, and is now in the process of management transfer.

It is conveniently located on the main east-way highway, giving it access to markets, some opportunities for local off-farm employment and easing seasonal migration opportunities. Although most of the community are immigrants to the area and came because of pressure on land in the hills, this land too is now over-populated and most farmers depend to some extent on non-farm income.

4.2 Institutional arrangements

There are two levels of institution, one for the main canal, and one for the 10 branch canals. Each branch canal (irrigating 20-100 ha) is managed by an 'in-charge', with one or two assistants. Each in-charge and, in the case of large branch canals, one or two other are members of the main committee. The main challenge to management is to capture water from the river. The river is in a wide cobbled-filled bed, so it moves in both level and location, requiring large numbers of labourers to ensure water enters the canal. Work is required before each crop season and often several times during the season, as floods can destroy the temporary intake. There are times when there is a shortage of water in the canal and thus the committee must be able to allocate water between the branch canals and ensure that those who steal water are punished. The management of the branch canals is the sole responsibility of the branch 'in-charge'.

This structure is simple, but has developed to suit the tasks required. There has been a more recent attempt to impose a standard WUA, which was registered with the District authorities but this was done as a bureaucratic requirement to ensure external financing for some improvement and has had little impact. Key features of the actual management system are:

- Strength and authority of leadership, although not strictly democratically elected.
- Continuing ability to manage large numbers of labourers (*urdi)* to maintain the intake which is the most critical communal challenge facing the system. This is a major strength, since without this there would be no irrigation system.
- a system of communication, although this has deteriorated recently with the breakdown of some of the more rigid caste-based rules.
- a system of sharing water at times of shortage – not in a formally documented rotation with strict order and duration of irrigations, but more as an understanding and agreement of how to resolve the issues as they arise. This depends on the authority of the branch and main canal leadership, and is flexible to cope with differing needs (due to soil type, crops, topography, rainfall etc), with norms established when community cohesion was greater.
- Disputes and penalties. There are penalties for failing to contribute labour for maintenance and for taking water out of turn or from unauthorised locations. Earlier these were considered very onerous and infringements were rare as the formal punishment was strictly enforced and accompanied by social ostracism. Now infringements are more common, and not consistently enforced. Defaulters may pay the fine more as a fee for obtaining water when they need it than as a punishment.
- Procedures are simple and understood, with generally adequate records. The system is transparent, resources are mainly in the form of labour with little need for cash. Officials are recompensed by exemption from labour requirements rather than by direct payment. This avoids the problems of managing cash and bank accounts as well as the need for auditing. The procedures are not always well-defined, but there is sufficient common understanding that this is not a serious problem.

It relies more on strong cognitive social capital, than formal institutions. This approach does face many challenges – due to migration, changing social norms (such as the *dalit* movement) – but has so far been sufficiently robust to withstand these.

4.3 Water Management

There are three challenges for water management

- To divert sufficient water from the river system
- To share water between branch canals
- To share water between farmers along branch

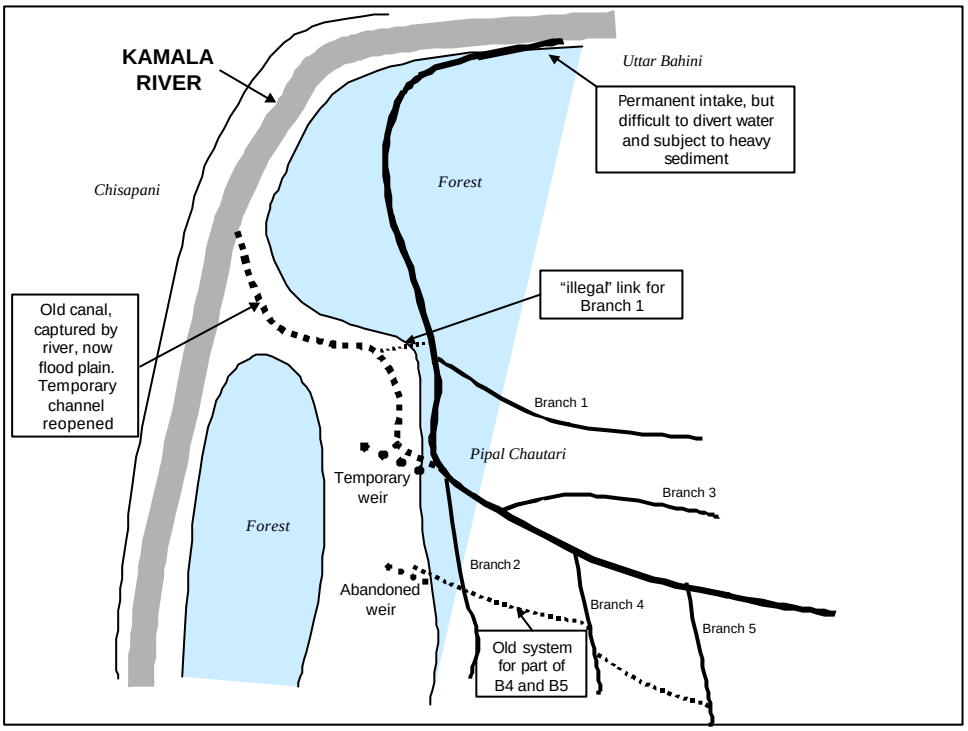
(i) Diversion from the river system

Several different arrangements (Figure 4.1) have been made at various times. Some are aimed at supplying water for the whole area and some just supply some branch canals. In the past there were several independent subsystems (branch 3, branch 1 and branches 4 and 5 were originally separate). These have now been integrated with a single permanent intake at Uttar Bahini, but this is difficult to maintain, so some old sources have been re-opened to provide some extra water. These sources, however, are risky and may attract the river to attack the bank, thereby causing loss of agricultural land. Branch 1 is also problematic as it is at a high level. Last year the Branch 1 farmers refused to contribute to reopening the old main intake at Chisapani as they thought they would not be able to get water from it. They preferred

to rely on the Uttar Bahini intake, but they were unable to maintain this on there own so they later opened an "illegal" offtake from the Chisapani intake that they refused to contribute to. They were fined for this infraction.

Thus the situation is very fluid and major changes to fundamental features of the layout are common. A key task of the management institution is to plan and implement the necessary changes each year. If this is not done well, the system could totally fail to supply water. The WUA thus has significant responsibilities, which require skill and imagination to solve and involve technically more sophisticated tasks than any required of WUAs after management transfer (such as at SMIP).

Figure 4.1 Layout of Intake for Kamala Uttarbahini Irrigation System



(ii) Water sharing water between branch canals

This together with maintenance of the canal is the responsibility of the main committee. At times of shortage the branches are divided into two groups and irrigated alternately. It is not possible to allocate water very accurately: some permanent structures were built recently to help with this but they do not divide water proportionately (nor measure it) as there is insufficient head available. The allocation is not equitable – crop water requirements vary, and different crops are grown to suit availability of water in different parts of the system. This can be contentious, as farmers monitor the situation closely at times of shortage and no accurate system is possible. However, use of these structures as a basis for allocating water is at least objective. Much depends on the credibility of the WUA to enforce the rotation durations and prevent disputes (this indicates that there is a higher level of cognitive social capital than at SMIP). If water is severely short the main committee organise farmers from the whole command area to work at the intake to augment the supply at the system. Farmers who are facing water shortage may request the WUA to arrange this.

(iii) Water sharing between farmers along branch canal

Variations in topography make water sharing difficult to manage objectively; some land is difficult to command without checking the canal or using pumps, and water requirements vary as the soil types change significantly towards the tail. There are nominally agreed rotation schedules, but it is difficult to find instances of these being followed rigidly in practice. Instead, the branch 'in-charge' makes an informed judgement of the best allocation at the time and may adjust the rotation accordingly. Given the state of the infrastructure and the variability of water requirements this may be the simplest approach. However, his judgement may take account the priority of different users – recent immigrants to the area, at the tail of the system may have secondary rights to water as they have not contributed so long towards development and maintenance of the system. As these are at the tail-end, are ethnically distinct and generally poorer, this system may be rather inequitable.

5 Institutional Development

5.1 Introduction

The observations above illustrate the presence of many different interests, affecting the functioning of WUAs, and the importance of identifying and understanding these. In the absence of an understanding of what the users want from irrigation and what they are willing to contribute, the objectives of WUAs are also often unrealistic. Furthermore,

despite the traditional exclusion of many water users, both on FMIS and AMIS, from any involvement in irrigation management, there is an implicit assumption that all users will benefit from irrigation, even if they are not involved.

This action research study is testing alternative approaches to making irrigation more sustainable, with a better distribution of benefits. A central element in this undertaking is the active involvement of water users in the development of these approaches. The first stage of the intervention was a diagnostic learning and action planning stage, in order to understand the various interests as highlighted above. Key features of this stage are to:

- Engage with all categories of water users, including all parts of the system, male and female, direct and indirect users, landowners and landless;
- Provide opportunities for expressing divergent views in informal settings;
- Understand the problems of the system from the perspective of these users, and in the context of their livelihoods, which involve many other issues as well as irrigated agriculture; and
- Develop an action plan, which aims to resolve these issues.

The second stage, which is now in progress, is to run a series of water users' schools, which will enable a wider range of water users to discuss these problems and develop potential solutions. In the course of these schools they will develop links with outside agencies and stakeholders who may be able to help in supporting the users in many ways. These schools are run for one morning per week throughout the cropping season so that the participants are able to work through the problems as they occur and develop their own solutions. The participants are linked to the existing water users organisation so that they can introduce these solutions to the WUA and thereby help modify and strengthen it.

5.2 Diagnostic Learning and Action Planning

Large scale irrigation poses great challenges for participatory studies. There are large numbers of stakeholders and many are not locally resident or are only occasionally so. A number of techniques are used, aimed at engaging as wide range of primary users as possible and gathering sufficient knowledge to plan the WUS, on the understanding that gaps in knowledge would be filled during the WUS as both sides gained confidence in each other. The area is divided into units roughly equivalent to a watercourse (30 ha), as this is felt to be the largest number of people who could reasonably be covered at a time. However, it is also important to consider appropriate settlement boundaries as well as irrigation boundaries as up to 50% of the population were landless; they are involved in irrigated agriculture but are not restricted to a particular watercourse command area. Techniques included:

- Social and resource mapping
- Well-being ranking
- Transect walks, with different stakeholders
- Focus group discussions, using groups based on the mapping and ranking exercises
- Key informant interviews
- Gendered task analysis
- Water use matrices
- Seasonal calendars
- Trend analysis
- Venn diagrams

The findings from this study are presented back to the group as a whole, and then written up as a concise report, which is given to the group for their own records. A number of groups (3-4) are covered in this way, and they together prepare an action plan, which form the basis of the issues to be discussed in the water users schools. This phase of the study is not aimed at gaining knowledge for its own sake, but as a way of engaging the users and planning the WUS.

5.3 Water Users' School

The Water Users' School (WUS) was conceived as a way of developing institutions in a way that would meet local requirements and solve local problems. One school was set up for an area equivalent to a tertiary canal at SMIP (150 – 200 ha). The reasons for selecting this sized area included that it represents the smallest practical coherent management unit, and that it is a unit that is not effectively managed at present. Two schools have now been in progress since February 2003 (spring cropping season). Further schools will commence in June 2003. Attendance at weekly sessions for one season is considered to be a realistic level of involvement, and has been achieved without the participants losing interest. Less frequent follow-up sessions may be needed in subsequent seasons. Each school is managed by a locally-based NGO. About 25 participants are selected by the community using criteria agreed during the diagnostic phase to be representative of all groups, and including some committee members of the WUA. 50% are women and each 'well-being' group is represented proportionately, ensuring a significant involvement by landless farmers. The school is held at a central location and there is a small field plot (0.2 ha) associated with it. The school draws on the Freirean concepts of 'learning by doing' (FAO, 2001). Rather than providing a one-off training programme, the school gives a forum for regular interaction to identify problems, derive solutions and monitor actions

The curriculum is divided into four categories – agriculture, water management, infrastructure and institutions. The logic of this is that participants grow crops in the field plot, manage the canals so that they can apply the water needed

for this, maintain the infrastructure to deliver the water and then develop appropriate institutions. There is considerable experience of agricultural aspects of such 'schools', as Integrated Pest Management (IPM) schools well-established and popular in Nepal. The approach in the Water Users Schools differs from this in going beyond individual learning, to develop the techniques needed for working as a group. It also differs from conventional training in aiming not at conveying information or skills, so much as in helping communities to identify and solve their own problems.

The main WUS are supported by three or four minor schools – one in each of the communities used for the diagnostic study phase. Members of the main school act as resource people for the minor school, which are run on the following day. These schools help develop the shared understanding of the issues and potential solutions, and also disseminate the outcomes of the major school.

For each issue, the WUS participants are divided into smaller groups to discuss it from their different perspectives. They then report these back to the WUS as a whole. This process is supported by specialist facilitators and technical resource people. Where possible resource people are selected from agencies with whom the WUA needs to develop better linkages, such as irrigation or agricultural extension offices. These resource people are more used to traditional training techniques and therefore have to be made fully aware of and in agreement with the approach. In some cases they are involved in the diagnostic phase as well, but in others they are briefed subsequently.

As these schools are in their first season, it is too early to predict their impact, but some initial comments can be made.

- The approach is new and it takes time for both the NGOs and the participants to understand the approach fully, and it requires a very intensive level of effort but this can be expected given the complexity of the issues and magnitude of the problems.
- The group approach is able to bridge the conflict between people's reluctance to participate in public meetings and the need for a wide consensus before communal decisions can be made
- The depth of participation has led to a common shared understanding of the issues both within the community and with key external stakeholders
- They can develop a multi-sectoral approach, rather than focus on the narrower interests of the line agency which initially promoted the concept of WUAs
- The approach as helped some groups to become more willing and confident to express their views in public meetings
- Women have participated actively in the school, demonstrating their keen interest in becoming involvement in irrigation management.
- Participants are encouraged to move beyond the cynicism inspired by past failures to develop WUAs, and to seek solutions rather find barriers to development – they can now see how to revitalise these institutions in accordance with their needs.

6 Conclusions

The reconnaissance study of water users associations and irrigation management transfer in Nepal confirms the growing realisation worldwide that it is extremely difficult to devolve management of irrigation schemes to users (Mott MacDonald, 2002). Expectations are high, and sometimes contradictory, and performance falls well short of these targets. However, the purpose of this study is to move beyond this negative conclusion, and identify in what way users can be involved most effectively and to greatest benefit.

The early findings are encouraging and suggest that it is possible to develop more effective participation in management of large-scale irrigation, which will then benefit the more vulnerable sections of the community. However, it is essential to have realistic objectives, and work with all sections of the community to achieve this. This will still take considerable time. WUAs cannot solve all problems which have been neglected in the past. The benefits to irrigation must be great enough for farmers to feel it is worthwhile investing in the effort required for community management. Sustained management will depend on an effective partnership between governments and users. If the objective is, as it so often is in reality, just to reduce government involvement and expenditure then it is unlikely to be successful.

Abbreviations

AMIS – Agency-managed Irrigation System
APM – adjustable proportional module
DOI – Department of Irrigation
FMIS – Farmer-managed Irrigation System
IMT – Irrigation Management Transfer
IPM – Integrated Pest Management
JM – Joint Managed [Irrigation System]
KUIS – Kamala Uttarbahini Irrigation System
NGO – Non-governmental Organisation
O&M – Operation and Maintenance
PIM – Participatory Irrigation Management
SMIP – Sunsari Morang Irrigation Project
VDC – Village Development Committee
WUA – Water Users' Association
WUC – Water Users' Committee
WUG – Water Users' Group
WUS – Water Users' School

Glossary

birta - land grant in Nepal
dalit – 'untouchable' according to the Hindu caste system
birtawal – landlord who is granted a *birta* landholding
jamindar - landlord
tarai – plains at the south of Nepal
urdi – system of labour contribution on farmer-managed irrigation
warabandi – system of rotational irrigation mainly practiced in the Punjab

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