

State Expectations and Local Interests: The Context for Irrigation Management Transfer in Nepal

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INTRODUCTION

IN MANY COUNTRIES in the developing world, the responsibility for managing irrigation systems which were previously controlled and managed by the state through its irrigation and agricultural support bureaucracies is slowly being transferred from the Central Government Authority to local communities. Such a process has been variously characterized as privatization, turnover, local institutional strengthening, democratization, decentralization, and so on.

Regardless of the nomenclature used, this trend has been driven by several varying forces at different places: fiscal crises faced by the developing countries, dwindling international assistance for irrigation infrastructural development, and pressures from international donors and lending agencies to make government bureaucracies more efficient. Yet at other places, the recommendation for management transfer comes from the assumption and the advocacy at times that the irrigation sector can perform better when controlled by the farmers themselves and that such management and governance transfer is in fact for their benefit.

In the study of this process whereby the governance of irrigation systems is slowly being transferred to local institutions from government authority, it is important to assess this trend in terms of salient features that are indicative of the relationships between the state and locality and the local communities themselves with one another. In the process of management transfer, the relationship between the agency and the farmers will first have to intensify, the locus of interaction increases leading in some cases to greater transaction costs, before the actual transfer has taken place. This relationship will have to be based on a different set of attitudes and orientations on the part of both the state apparatus as well as farmer groups.

This trend of management and in some cases ownership transfer in an agrarian society and economy of Nepal has also occurred because of the confidence that the planners and policymakers have had in the institutional capacity of the farmers and local irrigators in managing their own systems through their own customary practices and laws. Research on irrigation management in Nepal carried out in the early and late eighties has been instrumental in acquiring a recognized status for farmer controlled and managed irrigation systems. Such research on collective action portrayed by self-governing farmer irrigation organizations was able to put farmer-managed irrigation systems (FMIS) on the map of Nepal.

It was only in 1981 in Nepal that the government acknowledged their importance and began to consider ways to enhance and expand FMIS. The Irrigation Sector Policy for the Fulfillment of Basic Needs spelled out the direction that FMIS will be managed by the farmers themselves and that appropriate assistance will be provided by the government. In the first Five-Year Plan, the total area irrigated in Nepal was considered to be around 14,000 hectares (ha) for some 8.5 million population. Official irrigation statistics often ignored the area coverage and role of FMIS. In less than two decades since then in Nepal we see a noticeable change whereby there is a concerted effort in making even agency-managed irrigation systems FMIS.

Research and findings on the performance of FMIS have encouraged agencies to tap indigenous knowledge and skills of the local irrigators for government and agency assistance to them. Such farmer expertise and knowledge have also been utilized for bringing about participatory management in the form of joint management in several agency-managed irrigation systems of Nepal in the plains called the terai (IIMI 1992).

This paper provides a brief institutional and policy background of irrigation development in Nepal from a historical perspective and explores several scenarios of agency and farmer group relations in a variety of settings and contexts. The paper deals with the concept of local resource mobilization, an element that is going to be very important for the financial and institutional viability or sustainability once the systems are FMISs or are "turned over."

There are other aspects that are crucial elements of the turnover process and outcomes such as the performance of irrigation systems after the management transfer, equity of access to irrigation water between farmers, budget allocation for irrigation development and sustenance, organizational structure and changed roles of irrigation bureaucracies and farmer groups. However, this paper will highlight the resource mobilization aspect and the need to manage support services for attaining financial viability to some extent despite the dwindling agricultural economy of

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developing countries. The specific facilitating roles of the state may in fact lie beyond the irrigation system itself and more towards the sphere of macro financing and pricing policies.

HISTORICAL ANTECEDENTS

Readings on economic and social history of Agrarian Nepal (Regmi 1977, 1984) have pointed out the various and varying roles of both the state and the local irrigators in shaping irrigation management and the control of natural resources. The state and locality nexus, negotiations, bargaining, and shifting power balances have created the types of management styles that we currently find in the existing irrigation systems. Many direct and indirect relations exist between the farmers and the state. Such relations have been expressed through access to water, conflict adjudications, investment patterns, support service delivery, pricing policies, and development assistance patterns.

Even the so called agency-managed systems have a great deal of informal institutional arrangements for irrigation management. Similarly, in FMIS, certain formal parameters for institutional and legal arrangements are prescribed and proscribed by the state. The very necessity of registering one's organization, chalking up a constitution and by-laws to satisfy government or donor requirements, are examples of the "formal sphere."

If irrigation development at the macro level as well as at the system level is a product of this unfolding relationship between the state and local groups and between the local groups themselves, then it would be important to understand the nature and scope of these evolving relationships.

A variety of institutional arrangements exists and existed for the management of irrigation systems in Nepal. These have evolved as other changes in social and economic relations have occurred. The nature of the management style to an extent is a derivative of a combination of factors: the nature and impetus of the creation of the irrigation system, state-peasant relations and the nature of state appropriation of resources, cultural composition of the irrigators, the human settlement pattern, and others.

Legacies of the Past: Nepal's Agrarian Economy

Irrigation has been practiced in Nepal for centuries and a historical analysis of state measures and local responses can help us better understand the dynamics of irrigation. Much of what exists today is the legacy of the past. It is also within this understanding that future strategies can be formulated.

Four distinct periods (and of late five) can be demarcated in the history of Nepal to examine state-locality interaction in irrigation development. The logic for such periodization is the extent of the incorporation of the State of Nepal in the global economic system and the nature of the State especially in terms of governance (Pradhan 1990). The latest fifth period is characteristic of the recent multi-party system in governance and a thrust towards economic liberalization and privatization, but at the same time with an increase in borrowing of international capital especially as loans.

The five distinct periodizations are: i) pre-unification where small kingdoms functioned with relative autonomy, ii) post-unification where Nepal follows an expansionist policy in search of more land and confronts British Imperialism, iii) a century of Rana autocracy where Nepal's only outside contact southward is through the British (and the Nepali rulers needed British blessings to be in power), iv) post-rana period with the rise of the bureaucracy, partyless-governance and a dominant role of international capital, and v) multi-party system, economic liberalization, and increasing international borrowing,

Pre-Unification

Several irrigation systems date back to the pre-unification times and are still functioning. Historically, irrigation development falls under several domains: i) religious trust, ii) individual initiatives (primarily of the local elites), iii) community efforts, and iv) royal directives.

Each kingdom had its own way of dealing with irrigation development and functioning. Some had explicit policies regarding state intervention, others were left to function under customary norms. Naturally, the many irrigation systems dating back to the pre-unified Nepal have had different histories of resource mobilization for their initial and continued development (Regmi 1971; Poudel 1965)

Post-Unification (1779-1845)

This era witnessed a continued policy of using forced labor for infrastructural development in the economy. Local resources were mobilized through such state enforced corvee labor by state functionaries. Though the state did directly finance and construct irrigation facilities, the maintenance of such state created facilities was left in the hands of the tenants and revenue collectors. The accountability or liability lay in the burden of paying rents on registered irrigated

land. Though a sizable and capable administrative machinery existed for purposes of the army and revenue collection, day-to-day maintenance and operation of all of the state-created irrigation systems were beyond the capability of the administration. Apart from direct financing or irrigation system construction by the state, policies of financial incentives to irrigation entrepreneurs were formulated by the state.

Rana Autocracy (1846-1951)

In this era, a very significant event was the formulation of the penal code *Muluki Ain* that laid down the legal recognition of property rights in irrigation canals. Several types of customary norms, rules and practices were endorsed by the state. Both tenants and villagers from nearby were mobilized by the state through state functionaries to repair and maintain canals that were under the jurisdiction of state functionaries. A unique symbiotic relationship between the British and the Ranas ruling Nepal shared intercountry watersharing and conflicts over irrigation. It was also in this era that expatriates with western "scientific" knowledge were invited into Nepal for infrastructural development in irrigation technology.

The Rise of the Bureaucracy

Various measures for the alleviation of poverty and basic needs, not to mention the structural adjustment stringencies undertaken by the government, seem to have had impetus and coercion from the donor community whose ability to influence official policy is closely related to their substantial financial contribution to Nepal's economy. Since the 1960s, efforts have been made to rationalize and improve the quality and capacity of the state bureaucracy for devising and implementing effective development projects and programs. This expansion of the bureaucracy helped fulfill the role of the state as the key employer.

Several government agencies provided technical and financial inputs for irrigation development. Furthermore, agencies were either amalgamated, separated, or fragmented within and between ministries. The scenario regarding irrigation development by the government was that there are several agencies drawing from different types and sources of funding and multiplicity of approaches regarding the implementation of projects. Project financing was in the form of outright grants, or partial loans with a substantial grant component, or a combination with grantees' contribution, usually in the form of labor. Varying input levels—financial or otherwise—were required from the beneficiaries. The degree of beneficiary involvement during the projects differed from one agency to another and even from one project to another within the same agency. Different agencies approached the issue of maintenance and operation of the systems after completion differently. Some handed the irrigation systems over to the users, while other continued to control with minimal farmer input.

In spite of the irrigation bureaucracy being relatively new, there has been a steady increase in government involvement and assistance in irrigation system construction or rehabilitation. The trend during the past three and a half decades has been towards greater state mobilization of resources to finance irrigation administration and projects. Legislative acts and regulations (e.g., Irrigation, Electricity, and Related Water Resources Act 1967, Decentralization Act, etc.) were formulated by the state in recognition of the changing times as well as for laying down procedures for government interaction with the irrigators. The government can operate under the umbrella of these acts that grants unquestioned authority within eminent domain.

This era consisted of increasing state intervention in irrigation development, fiscal constraints to achieving national development plans, and a need for planning and mobilizing resources at the local level. This epoch also witnessed a multitude of irrigation financing strategies, both direct and indirect, implementation of irrigation projects, and the formulation of certain macro policies like decentralized and basic needs/poverty alleviation that impinged upon irrigation development.

Multi-Party System and Privatization

The present era is characteristic of a multi-party political system of governance which allows opposition and conflict within the regime rather than over the regime. Party ideologies and politics are crucial for governance. With the advent of the freedom to express and oppose, the general public holds high expectations of the government being able to deliver the goods that it promised, which generally is outlined in the preamble of the new constitution.

This era of change and anticipation however has to be juxtaposed with the realities that Nepal faces in terms of tenacity of bureaucracies for survival, attitudes, existing power relations, and the status quo. Several reforms have been undertaken to make the transition to an environment supportive of representational governance, local governance and participation, and enhanced role of the private and nongovernmental sectors.

INSTITUTIONAL AND LEGAL FRAMEWORK

In the institutional and legal framework for irrigation development, two important pieces of policy/legislation merit mention. The recent irrigation policy that became effective in 1992 makes references to legal recognition of water users as autonomous entities, rights and duties of the water users and the agency- user-managed systems to be under collective ownership of the users, the full ownership of turnover systems and the related structures to be with the water users association registered by the government.

A new Water Resources Act was passed by the parliament last year replacing the 1967 Act. A separate Electricity Act was also passed. This Act has addressed the issues of prioritization or hierarchy of water uses, privatization, incentives, licensing, etc.

A fundamental characteristic of the new Act is that the ownership of all water resources within the kingdom of Nepal is vested in the state and as the state deems fit allows corporations, communities, or individuals to use the resources. The people obtain the right to use the water either through licenses or is "granted" free access to water for certain uses. In case of facilities regulated by public agencies or private developers, the individual's rights become subservient to the terms and conditions imposed by the state through the concerned agencies. The Act also provides provisions for the principle of beneficial use of water, through the establishment of priority over various kinds of uses presumably based on a hierarchy of needs,²

With the government programs on turnover and joint management, several objectives are hoped to be fulfilled. These programs will translate to some extent the visions of user control and management laid down in the irrigation policy and the new Water Resources Act, reduce the transaction costs of irrigation bureaucracy to deal with many small irrigation systems, to promote local governance and decentralization to some extent, and primarily to ameliorate the fiscal burden and crises of the state. The scenario of irrigation development in terms of financing pretty much follows the previous epoch's route with increasing role of both local resources and international funds.

DIFFERENT SCENARIOS OF IRRIGATION DEVELOPMENT IN NEPAL

If in fact after management transfer, the systems are going to be locally managed then the current experiences of FMIS and the local resource mobilization issue in sustaining them become important. There are several implications that can be drawn from experiences of irrigation organizations and relations between agency and farmer groups for the management transfer process and outcomes.

Implications from the Study of FMIS

Yoder (1994) states that local control is the dominant influence in the success of the key activities of the locally managed irrigation systems. The success in continuing to mobilize labor and other resources for maintenance is the perception that responsibility for the contributions is divided equitably among all who share the benefits of the system. If system members have full authority to make decisions then it would be possible for the organization to modify its rules and adapt its rules and procedures to changing conditions. Another common characteristic of almost all successful FMIS is that virtually all irrigators have a voice in making decisions. Monitoring of adherence to rules, resource contributions, and fines is also undertaken by successful FMIS. They have the ability to contribute labor and other essential resources to keep systems maintained and operating; maintain an open atmosphere for sharing information and have developed a communication mechanism. Accountability and transparency in records, accounts, and work performance are maintained and provisions for sanctions and conflict mediation/resolution mechanisms are provided (Yoder 1994).

The understanding of the above mentioned characteristics of successful FMIS (which are many in Nepal and have been written about) would be important in outlining what systems that are being turned over to local management will need to look like (Yoder 1994). The forms and contents of the characteristics may vary depending on the history of the relations between the agency and farmer groups within that system that is being or will be turned over.

Implications from Assistance to FMIS Program

In an action research on assistance to FMIS (those that were not successfully managed and could be improved upon), the following lessons were found to be of primary importance in the formulation of assistance procedures (WECS/IIMI 1990):

²The priority order is as follows: a) drinking water and domestic use, b) irrigation, c) agricultural uses such as animal husbandry and fisheries, d) hydroelectricity, e) cottage industry, industrial enterprises and mining uses, f) navigation, g) recreational uses, and h) other uses.

1. If a system already exists, then farmer initiative has taken place, land and water resources have been identified, and some level of institutions, experience, and knowledge is available to be tapped.
2. The intention of "assistance" is to stimulate the irrigation users to be involved in making their own improvements (a little assistance is better than too much).
3. Poor maintenance of physical facilities and the inability of farmers to make simple improvements on their own are symptoms of a need to improve management, without which assistance will not be used effectively and the system will not likely operate to its potential.
4. Helping farmers manage the assistance inputs for physical improvements is an effective management training method that strengthens the water users organization.

Implications from Current Joint Management Program

In joint and participatory management systems, intense activities are being undertaken for facilitating the formation of smaller units of water users associations. Though at the initial stages of planning for irrigation development, joint management and turnover programs were considered to be separate activities, it is now perceived that joint management is a process leading to turnover. Even in the context of joint management, the issues of the relative power balance between the agency and water user groups in taking key decisions, facilitating water users associations, water rights and entitlement to farmers, mutual accountability on the part of both agency and farmer groups have been raised as concerns faced in many of the irrigation systems where joint management or participatory management are being introduced in Nepal (IIMI 1992).

Implications from Farmers' Initiative to Control Management in Agency Systems

There are many examples of irrigation systems that were built or rehabilitated by the government agencies but after a while the government could not continue providing any operation and maintenance costs and the farmers de facto have taken over the systems. Even if the government did provide some assistance, it was done on an ad hoc manner and not continued from year to year for the operation and maintenance of the system.

One such example of de facto "takeover" is the Pithuwa Irrigation System in the Chitwan area which was constructed in 1967 under the minor irrigation program. After this, a couple of additional construction works were carried out in 1971 when the main canal was enlarged up to the Pithuwa market, outlets were constructed in the branches and some modifications to the old canal network were undertaken. Further rehabilitation activities were carried out in 1974 when a permanent head regulator and more outlets were constructed (Shivakoti et al. 1987; Prachan 1994).

In this system, water is diverted into the main canal through an earthen approach canal from the river to the head regulator. Thus, after every flood, the approach canal is damaged requiring a few days of frequent repair. The government has provided a bulldozer to repair and maintain the approach canal and the weir during the monsoon. After the completion of the canal network, no water distribution policy was formulated by the government and conflicts over water distribution occurred. The more powerful were able to capture the water for themselves.

A certain social worker who had some experience in water distribution in a larger FMIS further west of Nepal from where he had migrated, took a leading role by motivating other farmers of Pithuwa to come up with a proposal to distribute the canal water on a time basis that was proportional to one's share of water. This was tried out in one of the branches at the tail end. A committee was formed in that branch and rules, regulations, and sanctions were formulated for water distribution in that particular branch. The water distribution in that branch was successful and it curbed many conflicts regarding water shares and distribution. The demonstration effect was successful and that within a year, a main committee consisting of fifteen members, a chairperson, and a secretary was formed and the water distribution practice set in that tail-end branch was emulated by other branches. The specific mandates of the committee were to make resources available for diverting water into the canal and also maintain and equitable distribution of water in the system.

As a first step of actions undertaken by the main committee, several alterations on the main canal were made such as the releveling of the branch head pipes, alterations and exchanges of pipes at the branch canals, extension of branch canals and field ditches to take into account the changes made to sub-command areas due to alterations in the pipes. These alterations were being negotiated amongst the farmers themselves to smoothen the agreed process to undertake equitable water distribution and resources for such alterations were mobilized from the government and the local irrigators. Though the government had set aside nearly Rs 100,000 for annual maintenance (to include intake work) since 1983, very little money (around 31,000) was available for 1986 and this money was handed over to the

main committee. Though the committee at first was reluctant to undertake main canal repair and maintenance, they gained confidence in their organizational capacity when they could do the desilting canal work in a couple of days' time.

The irrigation organization is currently being provided with a bulldozer for major desilting work and all operation and maintenance activities are carried out by the farmers. The farmers would like to possess their own bulldozer (to be used for non-irrigation activities too to raise cash for operation and maintenance of the system). The farmers do not want total turnover of the system to them for they fear that this will not guarantee them the chance of receiving a bulldozer from the government or the fact that a more permanent intake may be built by the government later on.

The farmers' intervention in the operation and maintenance of the system has improved the reliability of the water supply in the system. Alterations to outlets and their sizes were brought about to match a distribution of water and sub-command areas as agreed by the farmers.

LOCAL RESOURCE MOBILIZATION: IMPLICATIONS FOR TURNOVER

Local resource mobilization (LRM) will be crucial to maintain the institutional and financial viability of systems that have been turned over and are to be self-governing. To a great extent in the context of Nepal, labor constitute the greater bulk of local resources to be contributed. It is therefore important to understand the incentives and disincentives at work from local interests in the context of local resource mobilization. Given the fact that local labor contributions may bear little direct relationship to water received, we would expect that not all incentives and disincentives for labor contribution will be water related (Lynch and Pradhan 1988). Figure 1 maps a number of factors that may act as incentives and disincentives for local labor mobilization.

The term "incentive" can refer to things that agencies or other governing authorities do to stimulate local resource mobilization. They may grant power, rights, or privileges in return for participation; they may provide wages or food supplements for participants; or they may use their police powers to apply sanctions against those who fail to perform. The four factors at the top of the figure are institutional rewards and sanctions that irrigation agencies and governing bodies provide or guarantee to stimulate local resource mobilization. They constitute the incentive structure, but they are not necessarily the factors that influence farmers' decisions to participate.

Potential workers may base their decision to participate on their calculation of the benefits that they can expect as an outcome of their participation and the costs and benefits of non-participation. They will weigh these benefits against the opportunity costs of participation. These resultant benefits may be social or economic, water related or not, direct or indirect.

Increased agricultural production is a primary goal for irrigation agencies, but for farmers it is a rather problematic outcome of the labor contribution. First, even where there is a direct relationship between the irrigator's labor contribution and improved water deliveries to his or her parcel, this may only have a substantial effect upon yields under certain conditions. Yields will vary with water supply if it is adequate and reliable but not overabundant and where the other inputs required are present. Where irrigation makes it possible to bring a crop to maturity, farmers will exert considerable effort to keep the system functioning. But regular maintenance does not always mean the difference between a reliable, adequate water supply and none at all. More often the difference is incremental.

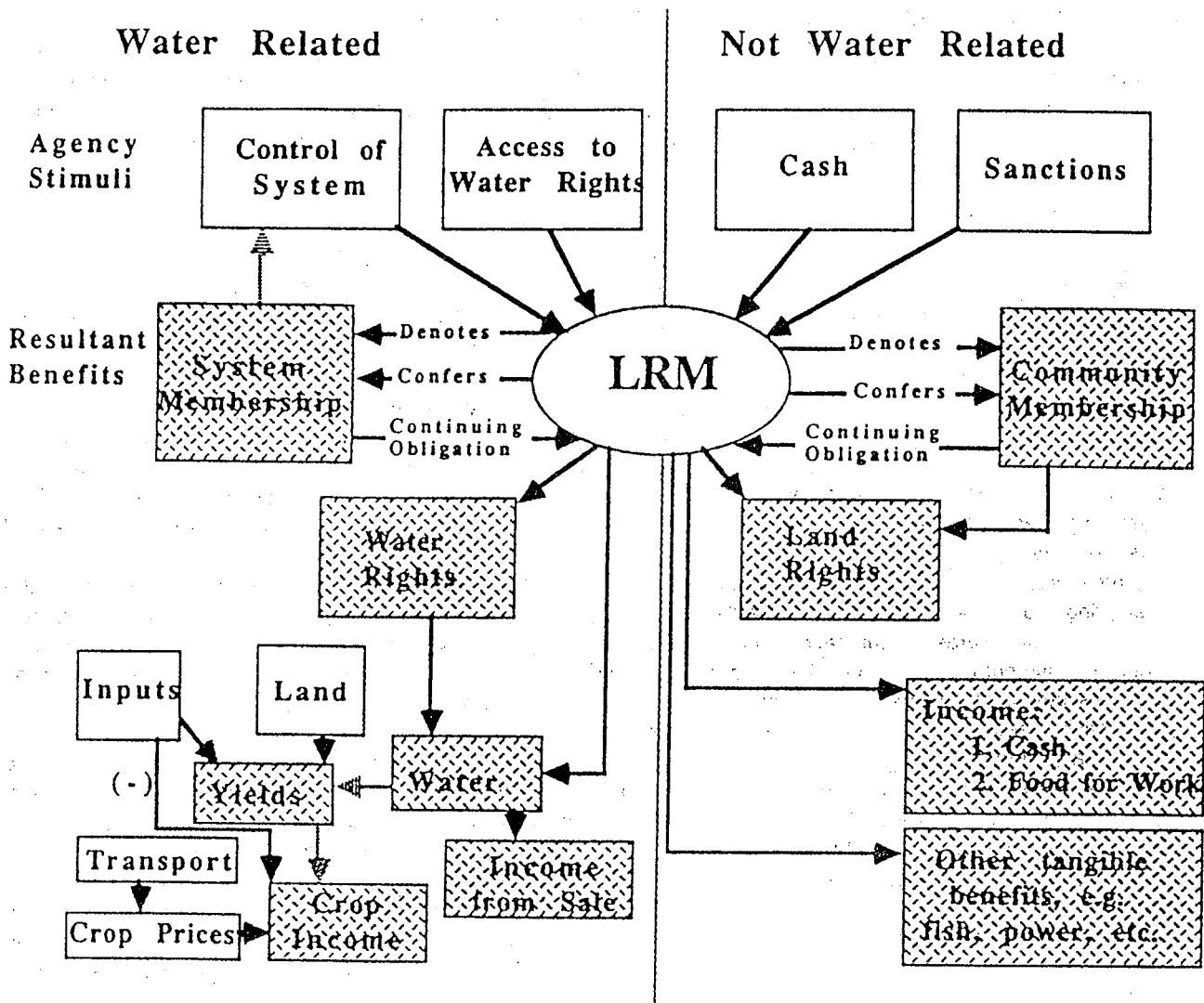
The perception of water supply as a benefit is closely related to whether or not water is a limiting factor in agricultural production. If it is not, the benefits of incremental yield increases must be weighed against the sum of input costs, including not only the costs of water and system operation and maintenance, but of the fertilizers, pesticides, and improved seed needed to maximize the benefits from irrigation.

Not all irrigators see increased yields as a benefit. Once they have met their subsistence needs, some farmers are more likely to be interested in income than in yields per se. Therefore, farmer benefits and incentives other than agricultural production increases may weigh heavily in farmer decisions to contribute their labor and other resources. Labor contribution may either denote or confer system membership. That is, participation in canal cleaning and maintenance in some areas is a symbolic expression of membership in the irrigation system and the perpetuation of one's water rights. Members may prohibit non-members from contributing their labor in these systems. Participation may be a precondition to membership in the system and access to an entitlement. The potential for incorporation of new members into a system is limited by technology, water supply, and politics.

Agencies may provide two stimuli for local resource mobilization that are not related to water. These are wages and sanctions. Resultant benefits to local resource contributions that are not water-related may include income in cash or in kind, land rights, community membership, and other tangible benefits from the system. The latter may include power, fish, and water for food processing, domestic use, milling, brick and livestock. Incorporating design features that accommodate other uses of water may build support for the project and reduce opposition.

Several factors may deter active local resource mobilization. The opportunity cost of providing labor may be high due to i) the coincidence of labor on the irrigation system with peak labor demand in agriculture, ii) the existence of off-farm employment opportunities in the local area, and iii) seasonal labor migration. Slack agricultural periods in the

Figure 1. Agency stimuli for local resource mobilization and possible resultant benefits for farmers.



irrigated zone may coincide with periods of high labor demand elsewhere. In hierarchical societies like those in Nepal, status can be a strong disincentive to labor contributions. The nature of the work may inhibit labor contributions. If the work is arduous and dangerous, participation level may decline precipitously.

Thus, local resource mobilization efforts for irrigation development—whether externally or locally generated—may not necessarily represent the collective will of the community, or even of the community of irrigators. Even when a project support is broad based, the opportunity costs of labor contribution may be high. Furthermore, the absolute availability of labor and other resources cannot be taken for granted, but must be empirically verified.

CONCLUSIONS

Over the past few decades, there has been a dynamic evolution in irrigation policies and institutions in Nepal. The actors in irrigation development have the twin objectives of poverty alleviation and sustained agricultural productivity. The Government of Nepal is making a concerted effort to support rather than supplant people's own development efforts. In empowering local organizations and beneficiaries, the state of Nepal envisions mitigating fiscal crises and supporting decentralization.

Given the aspirations of the public and hopefully the zeal to do better on the part of the irrigation bureaucracy, there are several newer opportunities and challenges for irrigation administration. The irrigation bureaucracies would do better by reducing its transaction costs in being involved in the usual operation and maintenance activities of irrigation systems that can be managed by the users themselves. One should be ready to place faith and confidence in the ability of the users to manage their own systems. We hope that the recent irrigation policy regarding turnover and joint management has been drawn with this in spirit.

Irrigation management and administration should go beyond the irrigation system and also focus on issues of i) managing support services, ii) sustainable development, and iii) watershed and regional approach. Irrigation water is only one input towards agricultural production and a variety of other inputs are equally necessary. The government agencies may not have been very instrumental or effective in delivering the goods, so an alternative that allows the private sector and the users groups themselves to manage support services and their timely delivery may increase the productivity needed for a rising population and sporadic droughts.

A change from rainfed agriculture to irrigated agriculture, and that too a change from traditional agriculture using locally available biomass resources to one derived from the green revolution with a heavy dependence on external inputs have shown changes in the environment. The irrigation practices and agricultural chemicals used in one rural community affect the productivity of neighbouring ones. An inappropriate use of pesticide, chemical fertilizer, water application has endangered the very sustainability of the irrigated land. Not only the soil but also the watertable under it has been found to be unfit for household consumption. With the slow erosion of traditional varieties and seeds and widespread adoption of external technology packages, the changes in the agricultural land composition are more rapid than ever. The escalating population, the search for higher yields, and state promotion of external input-intensive technology all have contributed to the rise in irrigated agriculture.

Given these outcome and processes of irrigation-environment interactions, institutional and legal framework should be established that addresses environmental sustainability not only in terms of the physical environment's preservation or for obtaining current sustenance from it but also in terms of the future generation's right to use and benefit from the environment (Pradhan and Thapa 1993).

Government agencies cannot assume that local resources will be provided for a project, but they can provide stimuli and incentives for different segments of population. They can also encourage local resource mobilization by co-designing structures that irrigators can maintain at a cost they can afford. Finally, they can conduct participatory feasibility and baseline studies that identify factors likely to affect the distribution of benefits, direct costs, and opportunity costs associated with local resource mobilization in order to identify appropriate incentives.

The July-August 1993 floods in this fragile Himalayan ecosystem ranging from mountainous Nepal down to the Gangetic Plain stand as witness to the need for beyond system-level focus, one that looks out towards the watershed and regional cooperation. The watershed approach will assist in establishing the fragile and delicate linkages between the hills and the plains and that an event in one area is intimately associated with the other. At a more geo-political level, regional cooperation is necessary for proper monitoring and advance warnings for potential and possible disasters regarding hydrological fluctuations.

Thus, irrigation management should look beyond mere physical irrigation systems and incorporate the social relations, the environment of irrigated agriculture and sustainability variables in its analysis. On the part of the irrigation bureaucracy, it should play more the role of a management organization that is service oriented and accountable to its clients. One of the positive roles of the irrigation bureaucracy in the post-construction era in irrigation development is to create an enabling environment for local governance, users' genuine participation, and use of local resources and skills. Certain bureaucracies have already begun to tap the knowledge and the appropriate skills of the farmers and

non-government organizations in the endeavour of institutional development of users such that they themselves will own, manage, and operate their systems. The positive roles of the government irrigation bureaucracy can be focussed on: i) being an impartial arbitrator for interdistrict, intersystem water conflicts; ii) undertaking research on its own design and planning procedures to learn from one's own past so as to manage and guide external resources, both human and financial; iii) monitoring activities at watershed and regional levels; and iv) playing an advisory role to the user groups if in need.

In sum, this paper related the various historical epochs of irrigation development in Nepal reviewing key characteristics within them and proposed newer opportunities for the study of irrigation management and newer roles for the irrigation bureaucracy, given the changed political and economic context. Focusing on the concept and operationalization of local resource mobilization, agency expectations and local interests (which may at times be contradictory) were explored. A realistic expectation and understanding of a self-sustaining local resource mobilization process (which is one of the many tasks in an irrigation system) is essential in order to ensure financial and institutional sustainability of the transferred systems.

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