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Irrigation Management in Nepal: Livelihoods Diversification and Institutional Responses

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1. Introduction:

“Penetration of governmental or quasi-governmental authority, demographic growth, market forces and even education are often observed as alienating forces reducing the viability and authority of community groups” (Blaikie & Sadeque 2000)

Globalisation and economic integration is strongly associated with local, regional and global markets. In the case of rural Nepal it would appear that resultant changes chiefly manifest themselves in livelihoods diversification and demographic transition through migration, at a rather rapid pace. This raises the question of the extent to which irrigation institutions are affected if agriculture is no longer central to people's livelihoods? The question is particularly relevant because current irrigation management approaches and the agricultural policies on which they are based do not reflect increased complexities. This suggests a need for examination of common property institutions in terms that go beyond their institutional capacity, to include both socio-economic circumstances and the livelihood strategies played out within institutional, social and economic contexts.

Most studies on the management of common property, while often based on implicit understandings of the role of the surrounding social, economic, political and physical contexts have, nevertheless, as pointed out by Moench (2002) and Dayton-Johnson (2001) among others, explained the workings of e.g. irrigation institutions at rather internal levels, and tended to analyse communities as stable entities in which people are seen to have incentives to manage resources that they are assumed to depend on for survival (Moench 2002, Sadeque

1999). The issue of how external forces may influence common property institutions has generally focused on penetration of government authority (see Blaikie and Sadeque 2000), ‘legal pluralism’ (see Meinzen-Dick and Bruns 2000) and focused on tensions between formal legislative and regulatory frameworks and the ‘traditional laws’ of collective institutions, with concern that dominance by the former may lead to erosion of capacity for collective action. Concern with the disappearance of indigenous management and technological skills is particularly evident in the case of irrigation in Nepal, where a great deal of research, by seeking to define factors of success, organisational form, functions and logics has sought to reverse a trend towards ‘governmentalisation’ of irrigation management (see e.g. Pradhan P, 1989, Pradhan P 2003, ILO 1995, Durga and Pradhan U, 1993, Rana 1993, Ostrom, Benjamin *et al* 1992).

Empirically, this paper is based on preliminary data related to the first phase¹ of a research project, which involves comparison between socio-economic and institutional circumstances over time, by means of a re-study of early-mid 1990’s socio-economic baseline studies from the International Labour Organisation’s Dhaulagiri Irrigation Development Project. At the present stage, the aim is to ascertain the extent and nature of livelihoods diversification along with the current status of common property institutions in irrigation. With a view to adding perspective to the problematic, the paper starts out with a brief review of the places assigned to rural institutions within influential rural development approaches and shifting paradigms. Following this review, the notion of the ‘local natural resource management institution’ will be examined in the context of the policy frameworks of Nepal of the past decades. We then move on to looking at the possible extent and effects of livelihoods diversification in rural Nepal, as reported by secondary sources, on irrigation management and rural communities, before finally analysing the situation in the case of irrigated communities in Western Nepal.

2. Theoretical Perspectives

2.1 Rural Institutions, Rural Development and Diversification:

Neat characterisation of certain periods as being dominated by specific thinking is tempting, but problematic as “*paradigms and theoretical frameworks tend to accumulate in a competing environment, rather than replace each other*” (Martinussen 1990:3). However, certain trends in the treatment of common property and related institutions within rural development theory, and its implicit understanding that the share of non-farm livelihoods activities rise

proportionally to those associated with agriculture over time, may be discerned. The early roots of modernisation theory highlighted the disappearance of ‘community’, and saw market penetration and urbanisation as community-eroding factors; erosion that was seen as predominantly positive (progress). These evolutionary views carried on to later modernisation theorists whose perceptions were characterised by negative views of community and village life, connoting it with being underdeveloped, static and fatalistic (Agrawal and Gibson 1999); factors that were seen as obstacles on the path from traditional to modern.

Dominant theories of structural transformation have not been as explicitly negative about ‘community’. However, with growth seen to emanate from agriculture, rural institutions, except for the market, have received limited attention. Classical structural transformation theories define the process involved in diversification as a proportional decline in the agricultural sector, in its contribution to national output and employment, and the rise of the manufacturing sector (see Kuznets 1966). Specialisation is an important mechanism in the process, as is the concomitant expansion of markets as the principal institution to integrate and facilitate the activities of the producers, the savers and the investors.

The central role assigned to the market may be further illustrated by the emphasis on essential production and consumption linkages as in the pervasive ‘regional growth linkage’ school, where:

- Backward Linkages: Represent the demand from agriculture for e.g. agricultural implements and input supply (fertiliser, services etc),
- Forward Linkages: Represent the supply of agricultural products to agro-processing industries, as well as a demand for transportation, and;
- Consumption linkages: Represent income gained from marketed agricultural surplus spent on household items and domestic services (see Start 1987)

Concern with the size distribution of farming households came to complement the growth linkages model, as a critical determinant of structural transformation. Johnston and Kilby (1982) have convincingly argued that unimodal patterns (in which the bulk of the land is cultivated by the bulk of the farmers) stand a better chance of more balanced economic development in which the essential linkages are utilised and felt in the local economic context, as opposed to bimodal patterns in which the bulk of the land is owned by a minority and local economic linkages are negligible².

However, as highlighted by Ellis and Biggs (2001), the rural growth linkages model continue to be at odds with the ‘political economy of agrarian change’ thinking, due to the former’s neglect of divisions in rural society. Traditionally, the emphases in the latter approach are on inequality, class, power and social differentiation and on the forces of development under capitalism that influence these. Within this framework, with its focus on rural property relations in agrarian change processes, collective action generally connotes collective resistance to those institutions that serve as mechanisms of socio-political control (Berg 1991) rather than the abilities of communities to cooperate on the management of resources.

North (1990) while aligning himself closely with mainstream neo-classical economics and its evolutionary perspectives on economic growth and rural growth linkages models adds – with a focus on transaction costs – institutional nuances to conventional structural transformation models. In North’s village trade is limited, as are subsequent transaction costs; whatever exchange exists is facilitated by a dense social network of ‘informal constraints’. However, as markets grow and cover larger distances, transaction costs increase as trust and kinship networks can no longer be relied upon. Faced with increased complexity, institutional features in the shape of standards, legislation and, eventually, capital markets emerge.

The predominance of modernisation theories, as well as Marxist inspired macro perspectives on development and underdevelopment and agrarian change that lasted well into the 1980’s also explains why the social and economic implications of the elaborate systems regulating cooperation in commons and semi-commons that prevailed historically, received little attention (Wade 1988). In the context of the more influential strands in rural development, common property and related institutions may be characterised as a minority discourse, at least until the 1980’s and 1990’s.

2.2. ‘The New Institutionalism’ and Process Approaches to Rural Development

The fact that dominant rural development theories have neglected the role of local (non-market) institutions in general and common property in particular, does not mean that common property institutions have been a neglected issue as such. As is well-known, a great deal of research into community-based approaches to the management of water and other natural resources came about in reaction to Hardin’s article on the ‘Tragedy of the Commons’ with its arguments that environmental degradation was inherently related to common ownership (Hardin 1968).

These reactions formed a theoretical context that continues to inform policy and research, and which has paved the way for the local resource management institution to occupy a significant place in development policies in general, and irrigation policies in particular. The theoretical basis underpinning theories on how common property resource institutions and other forms of collective institutions may work, found resonance in the New Institutional Economics that made headway from the 1980's onwards, more specifically the strand³, which deals with collective action in relation to public or collective goods and common property resources (Nabli & Nugent, 1989). Within this framework, as is well known, it has been demonstrated that the presence of specific rules and incentives may overcome the problem of free riding, and that institutions - based on individual economic rationales as determinants for investment in collective action - are efficient ways of organizing economic activity (E Ostrom 1990).

These theories were situated in the post-structural turn which Blaikie and Coppard claim that the "*social sciences have taken over the past decade or so, to focus on the competing knowledge claims of science, the state and formal institutions on the one hand, and the farmers on the other*" (1998:28). Overall, the 'paradigm shift', has stood in contrast to the macro-perspectives on rural development outlined above, by envisaging "*rural development as a participatory process that empowers rural dwellers to take control of their own priorities for change*" (Ellis and Biggs 2001, 443). Central to this shift was a focus on actor-oriented perspectives with rural people understanding and influencing processes of change.

Much of the academic debate in the last couple of decades has indeed focused on the structure vs. actor, agency and practice controversy. Considerable critique of the analytical value of alleged 'post modernist', 'neo-populist' and 'social constructionist' views and notions that tended to see the 'institutions as the facts' emerged (see e.g. Blaikie and Coppard 1998, Blaikie 1996, Harris and De Renzio 1997). In essence, however, it appears unproductive to apply a dichotomous framework to institutional approaches and much more analytically useful to apply the common property school's⁴ insights into institutional and social processes at internal levels, in combination with more structural historical approaches that focus on the total system of relationships in rural societies as key factors that shape livelihoods.

3. The Natural Resource Management Institution in The Rural Development Framework of Nepal

3.1 The Resurrection of the Local Resource Management Institution in Nepal.

The paradigm shift that has been briefly described above found – if somewhat belatedly compared to other Asian countries – fertile ground in the newly democratic Nepal of the 1990's, particularly with respect to the notion of the local resource management institution. This form of institution was neither new to Nepal nor to the region where, historically, resources have been community managed in one form or another, albeit with social and economic ramifications that differ significantly from e.g. Southeast Asia⁵. However, local irrigation management in Nepal, in the period from the early 1950's to the early 1990's, became increasingly 'governmentalised' (see Pradhan and Yoder 1990, Ostrom, Benjamin *et al* 1992, ILO 1995). This trend that gradually eroded indigenous water management capability was slowed down to some extent with the introduction of democracy in Nepal in 1990, and the subsequent dawn of policies supporting decentralisation and involving steps towards more autonomous management of natural resources at community level.

Gradually, the local resource management institution came to occupy a significant role in the development strategies and legal framework of Nepal, promoted by development agencies for which local natural resource management organisations continue to be considered particularly appropriate institutional forms. The process was helped along by a series of influential studies that rediscovered the historical role of indigenous irrigation (see Yoder 1994, Pradhan P 1989, Ostrom, Benjamin *et al* 1992, Tang 1994) and forestry (Messerschmidt 1991). The local, natural resource management institution rose to prominence during a period where Nepal (like most of the rest of the region) adopted structural adjustment policies and associated policies of economic liberalisation. While as Ellis and Biggs suggest “*advocates of grassroots approaches may like to think that that they have nothing in common with World Bank market liberalisers, nevertheless the spaces in which grassroots action flourished from the mid-1980' onwards were created in some measure by the backing off by big government from the heavy-handed involvement in the rural economy. A growing disenchantment with the performance of state rural development agencies was an important shared agenda across a number of divergent rural development actors*” (2001:443). Thus it may be argued that the local natural resource management institution with its theoretical emphasis on incentives and

choice was particularly attuned to the liberal environment promoted by international donors (see Johnson and Start 2001).

3.2 The Rural Development Framework and Changing Realities.

In addition to the themes already dealt with, the current rural development framework (to 2015) has been prescribed by the Agricultural Perspective Plan of 1995, which is based on a strategy that relies on agriculture as the engine for both economic growth and poverty alleviation, very much along the lines of the ‘growth linkages model’ mentioned in section 2.1. The plan emphasises the dynamics of the private sector, market forces and sees obstacles to growth as chiefly technological, with policy foci ranging from access roads, fertiliser, irrigation and research (see Cameron 1995). The plan’s reference to the centrality of agriculture in Nepal’s development is problematic. With more than 85 % of the population according to the 2001 census reportedly living in rural areas, agriculture certainly remains important, but not as important as it used to be, as rural dwellers diversify their livelihoods through off- and non-farm income generation. The low growth in agricultural GDP (2.6 % a year on average over the past 20 years) and a 40 % agricultural contribution to GDP in the mid-90’s (Seddon *et al* 1998) compared to 65% in the mid 70’s (World Bank 1990) is evidence of this.

Furthermore, in contrast to the intentions of the Agricultural Perspective Plan, Nepal has so far failed to experience the transformation that in other countries has led to the transition from agricultural to industrial economies; instead resource transfers into non-agricultural sectors increasingly appear to come about as a result of non-farm income and remittances from migrants. However, both the Agricultural Perspective Plan and the World Bank continue to see migration and remittances “*as an unfortunate and marginal by-product of a stagnant rural economy, to be eliminated progressively by programmes for economic development within Nepal and within the agricultural sector*” (Seddon *et al* 1998: 4) Irrigation development is one of the pillars of the plan, and water user’s groups are seen as a key mechanism for the organisation and management of irrigation systems. But how feasible is it to assume that communities remain stable entities with incentives to manage resources if these are no longer central to livelihoods and survival?

4. Livelihood Diversification in Nepal

4.1 Local Communities and Socio-economic Change:

Recent research⁶ seriously challenges the perception of rural Nepalese communities as stable. Rather it finds that migration in search of economic opportunities is widespread and remittances are increasingly important to local communities (Seddon *et al* 1998), and that new technology⁷ and advances with respect to the upheaval of human capital in general (Blaikie *et al* 2002) directly affect local livelihoods. Blaikie *et al* (2002) have compared data on non-farm incomes from the mid-seventies with data from the mid-nineties and found that among the poorest households, only 35 % had non-agricultural income in the mid-70s, while in the mid-nineties the figure was at 53 %. For middle households the figures are 32 % and 38 %, while for rich peasant the figures are 51% and 73% respectively. According to 2001 (census) data, aggregate employment figures suggest that 1/3 of the economically active population were solely involved in non-agricultural activities (ICIMOD 2003). Compared with World Bank data from the 1980's suggesting that 14% of the population worked in non-agricultural activities at the time (World Bank 1990), the trend towards an increasing proportion of the labour force engaged outside agriculture seems quite clear. In the following the focus will be on migration as the singularly most important indicator of the role of regional and global markets, as it seems to have the most far-reaching effects on rural livelihoods and social structures.

Male farmers seeking to escape the poverty of far western Nepal have for decades been both permanently and seasonally employed in India in vast numbers. Likewise, Gurkha soldiers from the western and eastern hills have traditionally been employed in the British and Indian armies. In addition, women and girls from a variety of places, but with a concentration in the central hills, have for sometime worked in the commercial sex industry in India (see Seddon *et al* 1998). Recently, Nepalese women have begun to migrate formally, chiefly to the Gulf. From an official estimate of 400,000 people working abroad in 1980, the figure for the late 1990s was probably as high as 1.4 million, or more than one in twenty of the population. The importance of migration for the economy should not be underestimated; a conservative estimate puts the value of remittances at NRs 35 billion, which is close to the 1997 official figure of NRs 38.3 billion for all foreign exchange earnings combined, while the most liberal estimate puts the figure at NRs 69 billion or almost double the official foreign exchange

earnings (Seddon *et al* 1998). In the early 2000s, annual remittances are reported to have reached around NRs 100 billion (Kathmandu Post 20.04.2004)

Access to foreign employment is highly unequal. Relatively accessible India remains the most important destination, both in terms of numbers of people who go there (more than one million) and in terms of their remittances. The difference between now and a few years ago, however, is that an increasing number of young people work in the Gulf, the West and the Far East. The absence of young men now strikes the visitor in parts of the hills. On top of the foreign migration comes the highly visible, but not easy to quantify, migration from mountains and hills to the towns of the *terai* plains and to Kathmandu that has been accelerated by the displacement and subsequent rural exodus resulting from the insurgency and counter-insurgency⁸. In many rural areas of the country the insurgency has led to economic crisis, displacement and exodus on a large scale (see Lal 2001). However, the full effect on the local economies and institutions remains to be thoroughly assessed.

Migration has indeed been a traditional means of improving livelihoods in the Himalayan region (see section 5.6). However, it would appear that migration is part of the livelihoods strategies of many more rural families than ever before, increasingly for reasons of distress rather than opportunity. Today, while incomes from remittances may be ploughed back into rural communities in the short run, both local and foreign migration should probably be understood in the context of a trend towards structural and, subsequently, demographic change that is not restricted to Nepal, and which—according to one estimate—may see urban populations surpass rural populations in a number of developing countries within a couple of decades (Pinstrup Anderson *et al.*, 1999). Some of the reported consequences of this trend for common property institutions in irrigation are reviewed below.

4.2 Reported Effects on Irrigation Management and Rural Communities

“Another challenge is presented by the economy. Political uncertainty, Maoist violence and global events have compounded the problem of an already stagnant agriculture base. Able-bodied youths from rural areas have migrated to urban centres and other countries in search of employment. Because the maintenance of FMIS’ (Farmer’s Managed Irrigation Systems – author’s insertion) is a labour intensive task, without the muscle power of young men, the task of repair and maintenance have been neglected in many systems” (Pradhan, P 2003:332)

The above quote points to serious implications of socio-economic change on the abilities of community-based water management institutions to manage water. While the subject has not been subject to in-depth research, scattered information points to substantial implications: Gyawali and Dixit 1999 note that the changing nature of labour relationships and increased mobility induce farmers to default on long-standing norms by working elsewhere instead of contributing to cleaning canals and erecting diversions⁹.

Blaikie *et al* (2002) note that the demographic restructuring of villages in the hills may lead to disintegration of the ‘moral economy’ of the village. Linked to this they note that ‘many rural households have become a sort of spatially disparate extended family. The results are increasing feminisation of rural life’ (2002:1268). As the economically active men migrate, the women are left with the children and elderly. The risks to those left behind are great “*if monetary remittances... decrease as the moral economy of the village disintegrates*” (2002:1268). Women’s rights to property (private and common) are generally weaker than men’s, and the absence of husbands creates vulnerability, particularly if the nature of the migration becomes more permanent and the status of the household shifts towards that of a *de facto* female-headed household.

This feminisation of rural life and its implications for the management of resources as well as property and other rights is one area that has been investigated in detail (see Meinzen-dick *et al*, 1997). Rural women contribute the majority of labour in agricultural production, but farm decision-making and management decisions with respect to collective property, however, are generally the domain of men. This raises the question of whether the productivity of, for example, irrigation systems can be maintained while the institutional memory, held by (old) men, gradually disappears.

5. Livelihoods, Diversification and Irrigation Systems in Mid-Western

Nepal.

5.1 Introduction

As presented in the previous section, scattered information from a number of sources supports the assumption that rapid socio-economic change may impact on communities’ abilities to operate, maintain and manage irrigation systems in general. As part of the present research,

these issues are under investigation in the mountain district of Mustang, and the hill districts of Myagdi, Baglung and Parbat in the Western Development Region of Nepal.

5.2. The Dhaulagiri Irrigation Development Project:

Within an overall policy framework that sought to halt emigration from the hills and mountains of Nepal, raise agricultural production and create employment, among other, these four districts were home to the Dhaulagiri Irrigation Development Project of the International Labour Organisation and His Majesty's Government's Department of Irrigation from 1989 to 1996. By the end of the project 67 irrigation schemes had been assisted, either as rehabilitation or new projects and 6,000 households or some 34,000 persons benefited directly from new or improved irrigation facilities.

5.3 Methodological Approach:

The Districts of Mustang, Parbat, Myagdi and Baglung were selected for this study because of the availability of historical data that enables comparison between socio-economic and institutional circumstances over time. As part of the Dhaulagiri Irrigation Development Project's monitoring and evaluation efforts socio-economic baseline and key-effects studies were conducted in 15 irrigation systems in all 4 districts on an annual basis in the period from 1992-1997¹⁰. The present research is based on these historical studies that allow comparison between socio-economic and institutional circumstances in the early-mid 1990's and the present. The research project is divided into a first phase (conducted in the first half of 2004) that entails a re-study of the baseline and key-effects studies of the 1990s, and a second phase (to be conducted in the second half of 2004) that aims to construct livelihood trajectories and link processes to the broader institutional context. This paper reports on the preliminary findings of phase one only. The re-study has followed largely similar methodologies and thematic areas as the socio-economic studies that were conducted in 1992-1995¹¹ in 15 irrigated communities. Thus, the 2004 "snapshot" contains basic data related to population, landholding size, the parameters of livelihood diversification such as income and source of income, employment, migration, and expenditure on food as well as data on yields, cropping patterns and cropping intensities. Institutional aspects include investigations into parameters of cooperation and performance such as organisational structure, operation and management practices, including labour inputs and the basis for labour contribution, as well as water supply, distribution and allocation. Other methodological features of the survey include:

Sample Design: As in the 1990's 20 % of the heads of households (male or female, as decided by the household) in the individual schemes were interviewed; however, with a minimum of 10 and a maximum of 30 households in each sub-project¹². As this is not a strict cohort study, original samples of households were not re-selected. New samples were taken based on official lists of landholdings. As with the surveys of the 1990's only households with land in the command area of the irrigations schemes were sampled. Also in line with previous methodologies, the sample was stratified according to the size of landholdings in the command area (large, medium and small), and represents separate locations of farms corresponding with the main branch canals, i.e. head, middle and tail.

Household Questionnaire: The 2004 questionnaire was shortened compared to earlier ones to fit the current scope.

Key-informants Checklist: Unlike earlier surveys, a specific checklist was used for interviews with key-informants (typically irrigation or village leaders) to obtain general level information

Data Collection Techniques: While the questionnaire used is fairly structured, assistants had been instructed (and trained – see below) in being observant, iterative, prodding and explorative throughout.

Survey Organisation: A consultancy company associated with the Department of Geography of Prithivi Narayan Campus in Pokhara conducted the 1992-1995 surveys. As part of the exercise the consultants (trained in an 'exact' sciences tradition) received additional training along the lines of participatory methods associated with informal level surveys, participatory techniques and a reversal of roles. In view of the knowledge possessed by this group, and with a view to ensure a homogenous approach, the original plan involved the participation of key members of the group in the re-study. Unfortunately, the security situation in the first half of 2004 deteriorated¹³ to the extent that only one area – Mustang District – was deemed a safe place to work for local academics. Subsequently, it was decided to utilise the local knowledge of a local NGO with some institutional knowledge of the Dhaulagiri Irrigation Development Project¹⁴ and, most importantly, an extensive network of skilled fieldworkers and a 'working relationship' with both the armed forces and the Maoists. Two senior staff from the NGO received theoretical and practical training and conducted the hill part of the survey under the supervision¹⁵ of the researcher.

Coverage and Duration: The deteriorating security situation meant that only 9 out of the original 15 villages could be visited¹⁶. While the original survey covered some 1350

households, the present survey covers some 975 households (or some 5500 individuals). The surveys were conducted over a period of 40 days during the months of April and May 2004. The findings in the following are preliminary, because time has not allowed for a detailed analysis of the present data, and because final conclusions depend on integrated analysis of both phase one and two data. At this stage, the analysis simply seeks to assess the extent of livelihood diversification compared to a decade ago, and the implications of possible changes with respect to irrigation governance and management.

5.4 The Setting

The irrigated hill and mountain districts studied are all located along the upper Kali Gandaki river watershed in north-central Nepal, with focus on a 75 km transect from Parbat district in the south, through Baglung and Myagdi districts northwards to Mustang district. Between Myagdi and Mustang the Annapurna and Dhaulagiri Massifs bisect the area, and whereas the southern parts are subtropical with monsoon rains, the northern part is located in the rains-shadow of the Himalayas with resulting arid conditions. Particularly in Mustang district, human habitation is defined by the Kali Gandaki river and its tributaries along which all arable land is located, where mainly barley, naked barley and buckwheat, as well as apples are grown under oasis-like conditions (see Messerschmidt 1995). In the southern districts paddy, wheat and maize constitute the main irrigated crops in the studied communities, but the cropping scenario is rather diverse including upland crops such as millet as well as a great deal of vegetable and fruit production.

While pockets of poverty certainly exist in Mustang, the district continues to rate above average on most socio-economic accounts and belongs to the 'Most Developed' category according to a composite development index for all the 75 districts of Nepal (ICIMOD 2003). Parbat, Myagdi and Baglung present very varied socio-economic conditions, with a tendency for (irrigated) communities at low altitudes, close to the main trading arteries¹⁷ to be relatively better off than communities in the hinterlands. While lower down the scale than Mustang, these 3 districts also feature among the one-third of districts in the 'Most Developed' category referred to above. The communities covered in Mustang are located in the Thak Khola and Bara Gau areas of Southern Mustang. Basic data associated with these communities is presented in table 1, below:

Table 1
MUSTANG SYSTEMS, BASIC DATA 2004

Community	Total Households* and Sample ()	Average Landholding Size** (Ha)	Command Area Size (Ha)	Population
Thini	190 (30)	0.33	93	1254
Tiri	14 (10)	0.75	11	79
KHINGA	34 (10)	0.59	45	218

* In village. **Of the sampled households

In the hill districts (table 2) the communities include Amalachaur and Arjewa in Baglung, Kurgha, Pakuwa and Lampata in Parbat and Pipalbot in Myagdi district:

Table 2
HILL SYSTEMS, BASIC DATA 2004

Community	Total Households* and Sample ()	Average Landholding Size**Ha)	Command Area Size (Ha)	Population
Amalachaur	119 (30)	0.24	35	625
Arjewa	127 (22)	0.16	20	800
Kurgha	234 (30)	0.29	80	1170
Pakuwa	122 (30)	0.36	55	732
Lampata	60 (10)	0.44	30	360
Pipalbot	75 (15)	0.44	31	N.A

*In village ** Of the sampled households

5.5. Livelihoods and Livelihoods Diversification in the Context of the Local Economy

Key informants and heads of households in all communities were asked the broad question of whether life had become better or worse over the past ten years. In the following we will focus on the responses from Mustang District: In KHINGA the informants claimed that life had indeed become better, chiefly because of a more stable supply of irrigation water. In Thini life has also reportedly improved over the past ten years, but here the reasons stated were two-fold, with sufficient irrigation water compared to before being one reason and increasing involvement in off-farm activities being another. In contrast, the key informants in Tiri found that life had become worse in the village over the past 10 years.

These statements reflect the dominant strategies associated with earning livelihoods in the respective communities, viz.:

- ‘Business’ ranks as the major source of income in Thini, with the sale of agricultural products falling in second, and official jobs in third place. Remittances play a minor role, and are mainly associated with government jobs outside the district.
- Agriculture continues to dominate as a main source of income in Khinga; ‘business’ ranks second, with tourism falling in third place. Remittances are important for only a couple of families.
- ‘Business’ is the major source of income in Tiri, and farming comes second. Foreign remittances come in third place and are important for one-third of the families

The statements also reflect changing conditions associated with pursuing these strategies:

In Thini trade and “business” chiefly connotes the buying and the selling in southern Mustang of livestock (jho¹⁸, horses) purchased up north, as well as tourism (hotels, shops). The sale of agricultural cash crops (cereals, vegetables and apples) and livestock products, remains, however, important as well. In this context it should be noted that Thini’s close proximity (45 minutes) to the district headquarter, tourist centre and transport hub (airport) of Jomsom Bazaar creates a great deal of demand for not only agricultural products, but also services and other activities associated with dynamic central places. While traditionally a major trading centre along a north-south trading route, the importance of Jomsom Bazaar has increased significantly since it became a district headquarter in 1975, with army and government personnel representing considerable demand for local produce (see Vinding 1984).

In Khinga, areas under cash crops, particularly apples, have reportedly increased over the past decades under conditions that are quite favourable due to a sheltered microclimate. In Tiri, on the other hand conditions for agriculture are relatively harsh, and irrigation water supplies are critical at times. In Khinga relatively benevolent cropping conditions have apparently helped offset the crisis (see below) associated with traditional trading patterns, which, as in Tiri, involves husbands and sons from most households going to Guwahati in Assam to trade for 3-4 months every winter where they sell sweaters and purchase items on the return journey. Furthermore, people in Khinga and Tiri are involved in the buying and selling of livestock, as well as Chinese goods, some of which are also brought to India.

Particularly in Tiri concerns were voiced about increased competition in the Himalayan trade pattern where the traditional winter trade in India faces increased competition from people in

southern districts who also increasingly go to India to sell garments. Additionally, the north-south trade in Chinese goods is not as lucrative as it used to be, as Chinese goods are increasingly abundant in Nepal and India through other channels. The economic conditions in these three communities should be understood in both a local and more global context: The relatively dynamic economy of Mustang District, exemplified by increasing flows of goods, services and tourists affect Thini (as a central place) positively, chiefly due to its close proximity to the district headquarter. Here, the majority of families continue to pursue traditional, but increasingly diversified economic livelihood strategies with agriculture remaining an important source of livelihoods.

In Tiri and Khinga, however, the dynamics of the local economy appears to have less of a positive effect on agriculture due to the distance of the communities to the district headquarter but also because competition from southern traders (including those in the district headquarter) has increased. In a wider context, the traditional demand for ‘indigenous Himalayan products’¹⁹, for which these people have branded themselves, is also facing competition. Not only because more people from southern districts in Nepal try their luck in India, but also because alternative (Chinese) garments have replaced traditional sweaters. Average annual household incomes in excess of USD 2000, however, remain relative high (some 3 times higher than those in the hills) and appear to have increased considerably over the past 9 years.

In the hill districts the respondents consider life to have improved in all the studied communities. Improved agriculture is assigned as the principal reason with access to foreign employment as the secondary reason. Agriculture does appear to have diversified substantially over the years to include cash crops such as coffee, bananas and vegetables that – thanks to improved infrastructure – is sold in the town of Pokhara²⁰ and beyond. Agricultural diversification accompanies high levels of economic diversification into off-farm activities that chiefly takes place outside the districts. Where commercial enterprise is a major source of income in Mustang, it is external, chiefly foreign, employment that constitutes the main source of income in these hill communities. However, average annual household incomes in the hill districts at some USD 800 are traditionally a lot lower than those in Mustang but have increased substantially, considering rates of inflation²¹.

In most cases farmers are reluctant to disclose cash incomes, and such data should be considered indicators of magnitude only²² In the context of this paper it is, however, the proportion of income earned from off-farm activities that is of major interest, as an indicator of levels of livelihoods diversification. Agricultural income is defined as sale of grains, vegetables, fruits, livestock etc, whereas sources of non agricultural income is defined as hotel/tourism, remittances, government service/army, shop-keeping, labour, trade, portering or transportation (mule trains). Comparing data from 1995 with data from 2004 suggest that non-agricultural income still constitutes the vast bulk of income: In the case of Thini probably even more so, as the proportion of households with less than 25% of income deriving from agriculture has increased from 47% to 63%. In both Tiri and Khinga, on the other hand, it appears that agricultural incomes are marginally more important in 2004 than they were in 1995, most probably as a result of increasing competition with respect to traditional non-agricultural activities (see above). In the hill communities non-farm income continues to constitute the bulk of household income, but also here agriculture actually seems to play a larger role in people's incomes in 2004 than it did in 1995. Moreover, the number of households that depend heavily on agriculture appears to have increased. More than anything, however, when considering the increases in income levels this appears to reflect what has already been suggested about agricultural diversification and an overall expansion of economic activity.

5.6 The role of Migration

It has been already been suggested that, compared to trade and agriculture, remittances play a relatively minor role in sustaining livelihoods in the villages studied in Mustang, and that the contrary is the case in the hills. Yet income earned in India has traditionally been, and continues to be very important to most of the households in Tiri and Khinga. This requires clarification with respect to definitions used: Temporary migration is categorised as migration of up to 6 months duration, while migration in excess of 6 months is categorised as permanent. Temporary migration has traditionally been important in earning livelihoods in the Himalayas²³, however, because of the traditional nature of this pattern of temporary migration it is not directly relevant to the problematic of this paper.

What matters in a perspective of economic diversification is the more permanent migration, which – as mentioned in section 4.1 has increased tremendously in many parts of Nepal. Here we may distinguish between the migration of households and the migration of individuals.

With respect to the former the past 10 years have seen no household migration changes in Khinga. However, 6 households have emigrated from Thini (apparently to Pokhara and Kathmandu). In line with traditional practice they have not actually sold their property; rather, their houses and agricultural land has been leased out, in this case to immigrants, mainly from areas north of Jomsom. Tiny Tiri now has 14 households compared to 16 households 10 years ago. Five households have emigrated south, out of the district, while 3 have immigrated from Dolpo and Upper Mustang. While, as Vinding (1984) observes, the rate of emigration from Thak Khola has probably slowed down since the 1970's a north-south migratory dynamic²⁴ remains evident.

The situation is somewhat different in the hill communities, where – considering that we are concerned with almost a decade – levels of emigration are not staggering with a total of 38 emigrating households or some 5 % that have emigrated. It should be kept in mind, however, that while agricultural land is leased out, immigrant households as in Mustang do not replace the vacating households. Turning to individual migration of the more permanent kind, historical household level data exists only for Thini, where the proportion of households with migrated members has increased from 53% in 1994 to 60 % in 2004. In all communities, however, all respondents claim that migration, particularly of the foreign kind has increased substantially, a factor, which, as previously mentioned, is assigned as a reason for improved livelihoods.

For migration-affected families in the hill districts, remittances constitute the main source of income. It is interesting to note (see table 3, below) that virtually all migrants in the hill communities are reported to be husbands and sons²⁵, while in the case of Mustang mainly sons and daughters tend to migrate. The figures provided here corroborate reports (see section 4.1) that individual migration in particular, but also household migration from both mountain and hill districts is relatively high, and that it has increased over the past decade. The question remains, however, to what extent this affects irrigation management, governance and agricultural production.

Table 3

ALL SYSTEMS: HOUSEHOLDS AFFECTED BY PERMANENT MIGRATION*

	Proportion of Households w. Migrants	Main Migrants	Destinations** (Proportional)		
			Nep	Ind	OC
Amalachaur	50	Husbands, Sons	8	79	13
Arjewa	50	-do-	20	63	17
Kurgaha	32	-do-	57	36	7
Pakuwa	37	-do-	50	29	21
Lampata	40	-do-	57	36	7
Pipalbot	33	-do-	17	17	66
Thini	60	Sons, Daughters	56	11	34
Tiri	60	-do-	10	50	40
Khinga	10	-do-	0	0	100

*Excludes Students/Children ** Nepal, India, Other Countries

5.7 Organisational and Institutional Aspects

As is often the case in Nepal, the institutional and organisational arrangements surrounding irrigation management vary between the communities concerned. Even among the Mustang systems, major differences occur between the relatively large, ethnically mixed village of Thini on the one hand, and the small, Bhotia dominated villages of Tiri and Khinga on the other. For example, in all three villages the irrigation system, along with other common property resources, is governed through village councils²⁶ whose responsibility it is to enforce regulations, manage funds, summon meetings and impose fines. The exact mechanisms for enforcement and resolution of possible conflicts are somewhat opaque²⁷, but observers generally agree that village councils with consensual leadership and high accountability, along with strong cooperation from villagers in common property management, are critical factors for survival in particularly Upper Mustang (Messerschmidt 1995, Parajuli & Sharma 2000). Traditional village organisation is largely unrecognised by government organisations and conversely, particularly in Tiri and Khinga only lip service is paid to government administrative systems. In Thini where concerns and scope for influence and power extend beyond the village, there is considerable overlapping between traditional and official leadership. For irrigation and other natural resource management purposes, however, it appears that leaders in Thini remain strongly accountable to their core constituents.

Thini, due to its large size has at least two councils, reportedly with 8 members each, headed by a Mukhya (village chief) each assisted by one head Katuwal (caretaker) and three deputy Katuwals. The Mukhya(s) and Katuwals are selected for a period of two years on the basis of merit. The head Katuwals appear to receive Rs 15000 per annum as remuneration. In Tiri and Khingha the Mukhya concept does not seem to apply; rather the councils with members representing each household appear characterised by joint leadership. The councils may be renewed every year (Parajuli & Sharma 2000). Tiri and Khingha each have one Katuwal, a duty that rotates between households every year. These do not seem to receive actual salaries as in Thini, but are possibly compensated in kind. In all three villages the Katuwals are responsible for routine maintenance of canals and other structures, the organisation of routine and emergency works and the collection of fees and fines etc. The resilience of traditional systems of governance may be illustrated by the fact that in Mustang nothing remains of by-laws introduced by the ILO and the government at the time of irrigation system rehabilitation. The by-laws (that completely ignored the existence of traditional governance structures), which, among other, devised organisational structures for irrigation committees with chairmen (*'adhyasis'*), treasurers etc., enabled user-group registration with local authorities and sought to secure democratic decision-making were indeed signed by the community, but upon the departure of the project's social mobilisers were quickly forgotten.

Mustang's village councils remain unique but obviously traditional systems of governance and management also existed in the hill systems (see Yoder 1994, Pradhan P 1989) prior to the ILO's organisational re-crafting. However, unlike in Mustang local politicians in the hill communities, exposed for long to government administrative systems, were quick to realise the advantages of formal committees. In many cases, political influence helped bring the rehabilitation project to the community in the first place²⁸, and its arrival reinforced such influence. In 4 of the 6 hill systems the 'crafted' irrigation committees continue to exist, while in Lampata and Pakuwa they have been defunct for the past couple of years, in the words of key-informants because of the migration of members and reduced importance of agriculture relative to other sources of income. It should be noted, however, that while all of the committees and user groups for the hill systems were renewed every year for the first 6-9 years, all such renewal has ceased since the start of the 2000s as (non-maoist) political life became increasingly problematic and local authorities increasingly unresponsive to local institutions.

5.8 Maintenance of the Irrigation Systems

As previously mentioned, in Mustang katuwals are responsible for monitoring of the water supply and for carrying out minor maintenance. For major, regular maintenance works such as cleaning of the canal each household is compelled to send an adult representative, irrespective of landholding size or other factors. Such work is usually carried out twice a year. In cases of emergency the katuwal informs the Mukhyas or the councils, who in turn mobilise labour from each household and maintain records. Participation is compulsory, and abstention leads to fines ranging from Rs 100-200/day. Abstention is not considered a problem in any of the villages and in none of the communities did the key informants find that the ability to mobilise people for collective action has diminished over the past ten years. One of the Mukhyas in Thini in fact found that limited migration in Thini was a determining factor for a well-functioning maintenance system²⁹. All interviewed households have expressed satisfaction with the way in which the irrigation system is maintained, despite the fact that labour inputs are required (4 days in Thini, 8 in Tiri and 10 in Khingha). The number of labour days has decreased historically as less maintenance has been required following canal rehabilitation.

In the hill systems maintenance issues are less structured than in Mustang and range from the case of Kurgha where one family has voluntarily assumed responsibility for monitoring the canal, to the case of Arjewa, Lampata, Pakuwa and Pipalbot with no permanent caretakers, and to Amalachaur where a permanent caretaker is employed. Labour contribution for regular (generally twice a year) maintenance in all hill systems is in principle based on landholding size, but is generally referred to as 'voluntary', and abstention is not uncommon. For emergency and structural damage assistance is often sought from local authorities for the financing of labour, but if the community is not successful in obtaining such assistance, it will carry it out by itself. If funds are needed, these are also generally collected on the basis of landholding size. Provisions for fines exist but except for Pipalbot these are not actually levied.

With a few exceptions the tendency over the past decade is for labour inputs to decline over the years, from an average of 11 days in 1993 to 4 days in 2004. It appears that the reason for the decline goes beyond that of reduced maintenance requirements, at least in Lampata and Pakuwa where the present state of the physical structures warrant more maintenance, and

where the villagers themselves point to problems with respect to undertaking collective action.

5.9 Water Allocation and Distribution

In the three Mustang irrigation systems water is allocated to individual farmers based on owned water shares and differs according to crops, with cereal crops receiving the highest priority. While small variations exist among the systems, the following summarises the general workings of the system: Small farmers with up to 5 ropanies get 1 share per 28 day cycle, whereas larger farmers with up to 15 ropanies receive 3 shares per 28 day cycle. A share corresponds to a specific date, decided upon by means of a lottery, within the cycle, on which individual or groups of households are allowed to irrigate their fields. On the given date it is the farmers' own responsibility to distribute water to their fields, and to ensure that gates are closed upon completion. It is the responsibility of the Mukhyas and/or village councils to monitor the system, keep records and to impose sanctions if required.

In the hills the irrigation committees are nominally in charge of allocation and distribution, which in all systems are on a rotational basis, but the system for allocating turns is somewhat unclear. It should be noted, however, that even for systems where caretakers are not employed on a regular basis, such people are appointed for monitoring distribution at the onset of the monsoon when planting of paddy takes place. As an indicator of acceptability and irrigation system performance, farmers were asked about irrigation water sufficiency (see table 4) In at least 3 of these locations, Tiri, Khinga and Lampata, the reason for perceived water insufficiency is of a physical nature^{30, 31}. For other systems, the increased dissatisfaction is rooted in either ambitions with respect to higher production (this is the case in Thini) or simply worse delivery, for reasons of institutional failure.

Table 4

ALL SYSTEMS**PROPORTION OF FARMERS CONSIDERING WATER SUFFICIENT**

	1993	1994	2004
Amalachaur	61	71	13
Arjewa	41	45	N.A
Kurgha	32	83	42
Pakuwa	46	59	40
Lampata	N.A.	63	10
Pipalbot	76	65	60
Thini	81	100	90
Tiri	100	60	30
Khinga	100	57	60

Farmers were also asked if they found that they received ‘fair’ shares of water or not:

Table 5

**ALL SYSTEMS: PROPORTION OF FARMERS RECEIVING FAIR SHARES OF
WATER (ALL LOCATIONS– HEAD, MIDDLE, TAIL)**

	1993	1994	2004
Amalachaur	88	90	7
Arjewa	86	68	0
Kurgha	57	90	42
Pakuwa	N.A	N.A	40
Lampata	N.A	60	0
Pipalbot	57	57	53
Thini	100	100	90
Tiri	100	100	80
Khinga	100	100	90

The vast majority of farmers in Mustang continue to find that shares are distributed fairly. Those who find shares unfair tend to be located at the tail-end of the command areas, thus suggesting that water shortages contribute to the creation of inequities in the form of so-called ‘tail-end problems’ even in seemingly well governed irrigation systems. In the hill districts

the proportion of farmers who find that they receive fair shares has decreased drastically. At this stage it has not been possible to ascertain if tail-end problems have increased, but overall this state of affairs adds to an impression of institutional problems leading to reduced equality with respect to water distribution.

5.9.1 Agricultural Productivity:

Similar to water sufficiency, agricultural production is an important indicator of the performance of irrigation systems. Current and historical agricultural output for the command areas of the Mustang communities is presented in table 6. In Thini yields have remained relatively stable over the years, with a record high 2004 buckwheat yield of 2.5 mt.. Overall this data suggests stagnating, but not necessarily declining yields.

Table 6

MUSTANG: YIELDS OF MAIN CROPS (METRIC TONNES/HECTARE)

Scheme	Crops	Base	1992	1993	1994	1995	2004	Means
Thini	Naked Barley	NA	3.1	4.1	4.7	3.6	3.4	3.8
	Buckwheat	NA	2.0	1.6	2.1	2.0	2.5	2.0
Tiri	Naked Barley	3.3	NA	4.1	3.8	4.2	4.9	4.1
	Buckwheat	2.4	NA	1.5	1.8	1.5	1.4	1.7
KHINGA	Naked Barley	1.8	1.5	2.5	3.4	3.4	2.7	2.6
	Buckwheat	1.5	0.9	1.3	1.5	1.6	1.7	1.4

In the hill communities, however, the data does suggest falling productivity as shown in table 7. Excepting paddy in Kurgha and Pakuwa yields have decreased significantly, to levels that are well below the average over the years, and in many cases even below levels prior to rehabilitation of the irrigation schemes.

Table 7

HILL SYSTEMS: YIELDS OF MAIN CROPS (METRIC TONNES/HECTARE)

Scheme	Base*	1992	1993	1994	1995	2004	Means
Amalachaur: Paddy	2.5	3.0	3.6	3.6	3.5	3.3	3.6
Wheat	1.7	1.8	2.4	2.3	2.7	1.2	2.0
Maize	1.7	2.0	2.8	2.6	2.7	1.9	2.3
Arjewa: Paddy	N.A	4.4	3.8	3.9	4.4	3.3	4.0
Wheat	N.A	1.7	2.2	2.4	2.6	1.3	2.0
Maize	N.A	2.4	2.9	2.3	3.0	2.1	2.5
Kurgha: Paddy	N.A	3.0	3.4	3.8	3.7	3.7	3.5
Wheat	N.A	2.0	2.8	2.9	2.7	1.3	2.3
Maize	N.A	2.2	2.5	3.0	3.0	2.1	2.6
Pakuwa: Paddy	1.8	2.4	2.9	3.1	3.1	3.9	2.9
Wheat	1.5	1.5	2.5	2.3	2.5	1.0	1.9
Maize	1.1	1.5	2.5	2.6	2.9	2.1	2.1
Lampata: Paddy	2.0	N.A	2.7	2.8	3.8	3.3	2.9
Wheat	1.5	N.A	1.2	2.2	2.5	0.9	1.7
Maize	1.5	N.A	1.5	2.3	2.9	1.5	1.9
Pipalbot: Paddy	3.0	2.9	2.8	3.4	2.9	2.6	2.9
Wheat	2.1	1.8	2.0	2.7	2.3	1.0	1.8
Maize	2.1	1.6	1.4	2.7	2.3	1.1	1.9
**Paddy	3.0	2.8	2.8	3.0	3.0	N.A	2.9

* Yield prior to rehabilitation **So-called 'early' (spring) paddy

A second measure of agricultural productivity is that of cropping intensity³², which in the case of the Mustang systems (see table 7) appear to be stagnant in Thini, and have increased by 10% in Khinga, but have decreased by 21% in Tiri. These reported cropping intensities are close to the national average of 180% (Sharma 1999), but considerably higher than an estimate of 140% for Mustang made in 1984 (Vinding 1984).

Table 8

MUSTANG: AVERAGE CROPPING INTENSITIES

Scheme	1992	1993	1994	1995	2004	Means
Thini	164	185	184	183	180	180
Tiri	NA	191	183	192	166	183
Khinga	138	163	156	156	171	157

As with output, cropping intensities in the hill systems (table 8) have dropped since their peak in the mid-nineties, when systems such as Kurgha and Arjewa reported virtually full cropping in all three seasons. All systems, however, report cropping intensities that are very close to the average over the years. While the drop may be significant, another year of measurement would be preferable before anything much should be concluded in this respect.

Table 9

HILL SYSTEMS: AVERAGE CROPPING INTENSITIES

Scheme	1992	1993	1994	1995	2004	Means
Amalachaur	176	227	251	262	246	232
Arjewa	224	250	233	296	275	255
Kurgha	228	241	282	287	266	260
Pakuwa	185	197	215	227	206	206
Lampata	N.A	198	215	251	237	225
Pipalbot	211	206	259	N.A	209	221

6. CONCLUSION

How reliable is this data? It may be justifiably argued that the sample size is relatively small. Therefore more comparisons with other historical and contemporary surveys need to be made to check conclusions. Additionally, the survey findings need refinement, the statistics need working on and the quantitative approach may benefit from the planned addition of a more qualitative approach. Moreover, the socio-economic diversity of Nepal renders any area studies untypical, even if the sampled irrigation systems and their settings are not necessarily very unusual.

Keeping these limitations in mind, the data suggests that livelihoods have diversified and even improved quite considerably in most of the systems studied. The majority of farmers believe that they have. An increasing proportion of the population works outside agriculture and access to both labour and commodity markets have led to considerably higher incomes over the past decade. Non-agricultural incomes, as in the early 1990s continue to constitute the bulk of incomes, but in most communities agricultural incomes are still very important, and appear, thanks to increasingly diverse cropping portfolios to increase along with non-farm incomes. The economic dynamics of the hills and the mountain districts vary considerably, but households in both categories depend considerably on outside markets for their livelihoods.

The study confirms that global and regional economic dynamics manifest themselves in widespread emigration from rural areas in Nepal. In Mustang this is offset by a north-south migration dynamic whereby new arrivals take up the places of the leavers and a tendency for male heads of households to stay behind under conditions where returns to agriculture remain satisfactory. This appears to translate into a willingness and ability to continue to invest in collective action, with farmers that generally continue to express satisfaction with the operation and maintenance of the irrigation systems.

While hill irrigation governance systems have generally always been less structured than their counterpart institutions in the mountains, operation and maintenance in some systems appears increasingly informal, and based on voluntarism and ad hoc mobilisation. The fact that many more farmers now, compared to a decade ago, are unhappy with water sufficiency and find that they receive unfair shares of water is a serious indication of some degree of institutional erosion. In the hills farmers claim that returns to agriculture have increased, but at the same time the performance of the irrigation systems, is characterised by significantly declining productivity. This is not necessarily a sign of institutional problems, but it may well be and will be investigated in further depth. So far it appears that while returns to agriculture may have increased overall, male migration translates into management problems and lower yields.

In sum, this study so far confirms that diversification, particularly as expressed through migration, may well have negative implications for managing irrigation as common property. It does, however, also suggest that the effects of diversification on irrigation systems vary

considerably between communities and ecological regions, and that these effects depend on a combination of local economic dynamics, livelihoods strategies and institutional characteristics. This, along with the finding that the relative importance of farming activities as the main source of livelihoods remains high, creates important challenges at development strategy level.

Notes

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- ¹ The second phase involves livelihood and institutional trajectories, and is scheduled for autumn 2004
- ² Johnston and Kilby's work which undoubtedly influenced policies calling for land reforms, contrasted the unimodal situation in Japan, Korea and Taiwan which have been characterised by increasing productivity within a framework of small-scale farming units, with the bimodal patterns found in the Philippines and many parts of Latin America, where increases in productivity have been concentrated in a sub-sector of large farms (see Johnston and Kilby 1975; Berg 1991)
- ³ Another strand of new institutional economics being concerned with transaction and information costs.
- ⁴ Moench (2002) traces the roots of this research that was conducted in reaction to Hardin (1968) to the Board of Science and Technology Conference on common property management in 1986. A great deal of the insight is the result of the research carried out by the so-called "Indiana School" and has involved a great deal of cases from Nepal. (See for instance Ostrom et al 1993, and Tang 1994)
- ⁵ Bray 1991, along with Schendel, 1991, note that water control in South Asia has until quite recently been scattered and decentralized, thus not contributing to patterns of change, or "laws of motion" to the extent that they, according to Geertz, C, 1963 ('agricultural involution'), and Wittfogel, K, 1957 ('hydraulic society') took place in parts of East/Southeast Asia.
- ⁶ Reference is made to the body of socio-economic research carried out by the Overseas Development Group at the University of East Anglia in the mid 1970's and again in the mid 1990's, in the hills of Western Nepal. The first round of research provided an influential foundation for further analysis of the political economy of agrarian change in the region. The second round of research sought to understand how livelihoods had changed over 20 years by comparing socio-economic circumstances and the processes of earning livelihoods.
- ⁷ There are strong indications that the widespread use of pumps for groundwater irrigation by individual farmers seriously affects water management at the institutional level in many parts of India (see for instance Shah 1998). In the context of Nepal the use of pumps is mainly confined to the plains and is not as widespread as in neighbouring India, even if the phenomenon is reportedly on the rise (see Gyawali and Dixit 1999). In the hills of Nepal it is not unlikely that an increase in the spread of micro-hydropower devices, by privatising water use, may to some extent have effects similar to pumps. For figures in this respect see Danida/ESAP 2002.
- ⁸ See, for instance, Nepali Times, Vol. 161, 5–11 September 2003, 'Kathmandu's Malignant Urban Tumour'.
- ⁹ Similarly, Bardhan's (2000) study of irrigation communities in Tamil Nadu significantly associates linkages to urban centres with poorer maintenance and regulatory compliance.
- ¹⁰ The author being in charge of their design, implementation and modalities in the period from 1992-1995
- ¹¹ This entails 4 annual surveys, all of which involved the researcher. It was decided not to include surveys from 1996 and 1997, because: 1. Their quality and validity could not be confirmed, 2.
- ¹² This was deemed necessary due to resource constraints at the time. The smallest community has only 11 households, while the largest has some 245 households with land in the command area. In the small community 10 households were interviewed, while in the largest community 30 (or 13%) were interviewed.
- ¹³ The decisive factor being the Maoist attack on Beni, the headquarters of Myagdi District in April 2004.
- ¹⁴ The NGO (the Dhaulagiri Community Resource Development Centre) had been conducting social mobilisation activities in DIDP schemes in Baglung and Myagdi districts from 1992-1997.
- ¹⁵ The researcher sat in on interviews and conducted key-informants interviews in 3 of the 6 remaining villages. Apart from this, supervision and feedback was carried out from the NGO office in Baglung.
- ¹⁶ This was decided in consultation with the local NGO, which – to illustrate the security problem following the Maoist attack on Beni and subsequent air attacks by the army on villagers - had in its latest monthly staff meeting decided that 'no village meetings were to be held in the open'
- ¹⁷ A motorable road now link Myagdi, Parbat and Baglung with Pokhara.
- ¹⁸ A cross-breed between yak and common cattle
- ¹⁹ The woollens sold in Assam are not actually produced in Mustang.
- ²⁰ 3-6 hours of transport time from most communities

- ²¹ Which for the period amounted to average rates of about 5-6 % (Nepal Rastra Bank)
- ²² In this and previous surveys the information has been arrived at indirectly, by first requesting information about expenditure (which people tend to be a lot less reluctant to talk about) and then enquiring about how the expenditure is met.
- ²³ However, prior to the 1970's emigration was high for various reasons, including the collapse of the traditional salt trade, thus explaining the presence of Thakalis in Kathmandu, Pokhara and along the trading routes southwards from Thak Khola, most of whom engaged in hotel and restaurant business. Vinding (1984) suggests that this emigration, rather than resulting from distress only, was also to a large extent opportunity-driven.
- ²⁴ Messerschmidt (1995) also mentions this dynamic in connection with the village of Marpha close to Thini.
- ²⁵ In most cases a 'pull-factor' is evident, most migrant-affected families have more than one migrant (1.5 on average)
- ²⁶ Known as *Gempa* in Tiri and Khingha (see Parajuli and Sharma 2000 for details)
- ²⁷ Intra-community conflict as a subject is usually avoided in discussions with outsiders and no accounts have been found.
- ²⁸ Obviously projects were subject to screening, and whenever technical and social feasibility was deemed negative even influential communities were not able to get assistance. The project was, however, not subject to any area-based master-planning.
- ²⁹ Messerschmidt (1995) with reference to the nearby village of Marpha assigns considerable importance to this variable by suggesting that "...the realisation of economic opportunities (that) attracted the more entrepreneurial Thakali farmers away from Marpha. As they left, home farms were placed under tenancy with Bhotia immigrants, non-Thakalis, and the old system of irrigation was replaced by a lottery. The Bhotia farmers and a few remaining Thakali farmers began looking after water distribution on their own" (41)
- ³⁰ Reportedly, snowfall last winter at the source of Tiri's irrigation water supply (a high altitude lake) was lower than normal.
- ³¹ Passing through an ecologically fragile and landslide prone area, seepage and leakage has increased in Khingha over the years as a result of landslides and a sinking alignment. This is also the case in Lampata.
- ³² A cropping intensity of 100% indicates the planting of relevant crops in one season on all relevant land. If half the land is cultivated for two seasons, the intensity is a similar 100%. With three crops and three seasons, a maximum cropping intensity of 300% may be achieved

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