

**At the Crossroads: Continuity and Change in the
Traditional Irrigation Practices of Ladakh**

(Draft – Do Not Quote)

By Radhika Gupta and Sunandan Tiwari

Winrock International India

7 Poorvi Marg, Vasant Vihar

New Delhi, INDIA

Paper presented towards the 9th Biennial Conference of the IASCP, 2002

Abstract

With growing interdependence and interconnectedness in the modern world, globalization has increased the ease of movements of goods, services, capital, people and information across, as well as within national borders, drawing remote corners of the world into a larger global web. One such example is the region of Ladakh, situated in the northern part of India, forming the western extremity of the majestic Himalayas. A frontier between Central Asia and Tibet, Ladakh has been inhabited for centuries by people living in a state of self sufficiency based on a tenacious if only subsistent agrarian economy and the movement of goods via ancient trans-Himalayan trade routes.

Ladakh is an ideal example of an optimized human-nature relationship in terms of resource utilization. Resources being naturally scarce both temporally and spatially, the people of Ladakh have developed ways of life and social institutions that enable them to minimize conflicts and optimize their use. Socio-cultural practices of polyandry, inheritance through primogeniture and the offering of children to the monastic institution of Buddhism ensured that the population did not exceed the carrying capacity of the land and that land holdings remained intact as viable units of economic production.

A short cultivation period and scarce water resources constrain agriculture. These constraints are overcome by following age-old institutions and rules governing irrigation, codified as part of the land settlement records, reflecting the design principles for successful CPR management as laid out by Ostrom (1990). Underlying this entire system is a deeply entrenched ethic of mutual cooperation and reciprocity reinforcing social cohesion.

Ladakh's isolation and self-sufficiency has been gradually eroding over the past few decades with improved infrastructure and greater exposure to other cultures. Increasing tourism and military presence in the area have contributed to these changes by providing a broad spectrum of livelihood options along with an influx of goods, services, capital and information. This in turn has facilitated the gradual breakdown of the systems of polyandry and inheritance by primogeniture causing increasing land fragmentation.

The paper will examine the impact of globalization-induced influences on traditional irrigation practices to reflect on the challenges that these could present to traditional common property regimes in Ladakh. External influences have changed agrarian practices in certain parts of the region. These seem to be directly proportional to the accessibility of a village to external resources and are subsumed by the fact that the traditional economy of the region as a whole is being rendered fragile as these inputs and opportunities are of a contingent nature. The essential problematic of the paper therefore lies in two seemingly antithetical findings. Despite socio-cultural changes, increasing population and the ensuing land fragmentation, that have been facilitated by these external impetuses, the traditional rules governing water distribution for irrigation have consciously remained resilient. At the same time, the institutions that ensure the effective functioning of these rules are gradually being eroded by these same impetuses threatening to undermine the entire management system. Ladakh today is delicately poised at the crossroads of continuity and change.

Introduction

With growing interdependence and interconnectedness in the modern world, globalization has increased the ease of movements of goods, services, capital, people and information across as well as within national borders, drawing remote corners of the world into a larger global web. This has led to the transformation of hitherto relatively isolated regions both economically and culturally. Local modes of production catering to meeting subsistence needs rather than surplus production for exchange and profit have become links within a larger capitalist system. This entails a shift from resource efficiency to productive efficiency with significant consequences for the management of natural resources. There is abundant literature illustrating cases from different parts of the world, wherein common property resource management has as a consequence been eroded either through centralization / state take-over, or privatization.

This paper studies the impact of external forces of change on the traditional irrigation practices in one such remote corner of the world - Ladakh. The resource in question here is a renewable one – water, which is scarce both spatially and temporally. Ladakh is an ideal example of an optimized man-nature relationship, in terms of resource utilization. The constraint of the natural scarcity of water has been overcome by following age-old institutions and rules governing irrigation. The cultural practices of the region have laid the foundation of these institutions. The traditional irrigation systems in Ladakh are small-scale common pool resource (CPR) situations as referred to by Elinor Ostrom in her book ‘Governing the Commons’. As Section I of the paper will illustrate, these rules have remained resilient over the years. They find resonance in the principle factors outlined by Ostrom for the successful management of common pool resources over long periods of time; based on mutual trust, effective internal monitoring institutions and collectively determined binding agreements operating through the creation of well-defined boundaries.

The second section of the paper will place the resilience of the traditional irrigation system in the context of external forces that are bringing about changes in the economy

of the region as a whole. This is reflected more specifically for our purpose in the agrarian system. The paper attempts to show that the impact of globalization on traditional/ indigenous CPR regimes is not always a simplistic one of destruction. Work on the impact of globalization on the commons has predominantly focussed on the erosion of pre-existing practices and ways of life subsumed within the overarching distinction made between modernity and tradition. As will be seen in this paper, the interaction of cultural and social practices with external forces of change has an important bearing on CPR management. Communities can be seen as actively engaging with these forces of change in the very innovations they bring about within the ambit of their traditions without their complete effacement. As Escobar has written in attempting to retrieve the importance of the notion of the 'locality', '....it might be possible to approach the production of place and culture not from the side of the global, but of the local, not from the perspective of its abandonment but of its critical affirmation...this is what ecology allows you and indeed forces you to do; (Escobar 2001:147-148).

What makes the case of Ladakh especially interesting is that the impact of globalization on CPR management can be construed as being dual / antithetical in nature, if located within a longer temporal span. As of today, people have made innovations in order to keep the basic framework of the rules and institutions governing the allocation of water intact. The changes in values, both economic and cultural in the institutions underlying the customary practices have been accommodated to the rules. The rules themselves have not been changed. On the other hand, the inputs of external forces are of a contingent nature. They have increased the vulnerability of the modes of livelihood, which straddle the opportunities provided both by modernization and those based on traditional subsistence. The region on the whole is therefore being rendered fragile. What these risks would bode for the management of CPRs in the future is a question that remains open. Therefore, we argue that Ladakh today is delicately poised at the crossroads of continuity and change.

This paper is based on fieldwork undertaken to document the traditional irrigation practices in four systems in Ladakh. These are spread over seven villages located in the

district of Leh. The two villages of *Sabu* and *Alchi* represent two systems of intra-village CPR management. The other five villages are grouped into two systems of intra-village CPR management. These are *Phyang* and *Phey* in one and *Phuktse*, *Shara* and *Sharnos* in the other.

Part I

An Analysis of the Traditional Irrigation System in Ladakh

The Area of Study

Situated at the northern extremity of India, Ladakh occupies a unique niche – physiographically, climatically and culturally. A cold desert, the region is characterized by lofty ranges, mountain rock-walls, bare ridges, glaciers and snowfields. Geographically, Ladakh lies between the Karakoram Range to its north, the Himalayan Range to its south and the Tibetan Plateau east of it. The region is snowed in for almost 7 – 8 months, the remaining being the only productive months in the year. Lying north of the Himalayan watershed, Ladakh is deprived of the summer monsoon, with an annual rainfall of less than 12 cm a year (Osmaston & Crook 1994), making it one of the world's highest cold deserts. Temperatures here drop to minus 50 degrees Celsius in winters and hover between the 10 to 20 degrees Celsius range in the summers.

Despite the seemingly hostile conditions the region has been inhabited for centuries and its people have learnt to survive there by establishing a synergistic relationship with their environment. The worship of *glu*, or spirits of the Earth, demonstrates a real respect for all life, and a recognition that Man is a part of and not a master of the natural world (Norberg-Hodge & Page: 1982).

An Optimized Human-Nature Relationship: The Dialectic between Nature & Culture

Life in this landscape is severely constrained by the availability of water. Settlements are located in wide alluvial fans receiving water from streams running from glacial ice or springs. These are oases which despite the aggressiveness of the natural environment, have sustained the life and livelihood of the people of this region from time immemorial.

Ladakh is an ideal example of an optimized human-nature relationship in terms of resource utilization. Resources being naturally scarce both temporally and spatially, the people of Ladakh have developed ways of life and social institutions that enable them to minimize conflicts and optimize their use. An example of this can be found in their agricultural practices. Ladakhis¹, who have basically been agriculturists, have lived in a state of self-sufficiency based on a subsistent agrarian economy. In spite of a short cultivation period and scarce water resources the people managed to grow sufficient amounts of grain for the entire year – especially the winters when their movements were largely restricted to the household itself. Through a judicious use of land and water resources Ladakhi people not only managed to survive, but were able to enjoy a life of greater prosperity than that of many other Himalayan peoples whose natural resources are more abundant (Norberg-Hodge: 1981).

In order to ensure that they did not surpass the carrying capacity of the land, maintaining land holdings as viable units of economic production and a check on the population were two important aspects that had to be, and were, addressed. The socio-cultural practices of polyandry, inheritance through primogeniture and the offering of children to the monastic institution of Buddhism ensured just this.

The practice of polyandry, where only the eldest son in a family got married, and his wife automatically became the spouse of all his younger brothers ensured that there was a control over the number of households and that the family size remained small. There was also a lot more practical reason for the practice of polyandry in a resource-scarce region like Ladakh as Fredric Drew, an Englishman who visited the region in the early 1870s, describes in his travel log:

‘Polyandry, plurality of husbands is, except among a few richer people, quite general; it is much more nearly universal than is polygamy in India, and for this reason, that polygamy is a custom itself expensive, practically reserved for the well to do, while polyandry is an economical

¹ There are principally five races found in Ladakh three of which are of Tibetan descent. In this paper we refer to only the Ladakhi who are Buddhists and primarily practice agriculture.

arrangement, one established on the poverty of a barren country, and extending throughout the people as far as the indigence itself goes.’ (Drew 1976: 250)

This practice coupled with that of inheritance by primogeniture then ensured that the landholdings were not divided. The expansion of arable land, though not impossible, was definitely restricted which made it all the more vital that land not be divided into inviable units. The two practices of polyandry and inheritance by primogeniture were inter-linked in a symbiotic relationship and maintained a check on the population and the division of land resources. Another traditional practice that is followed to some extent even today is that of Lamaism, whereby a son from each family takes up the monastic way of life. This practice has not just a religious but also secular significance. This monastic system too played a role in controlling the population as it took a fair portion of the male population out of the reproductive stakes (Rizvi: 2001).

The Spirit of Ladakhi Life

The Ladakhi way of life is based on the ideology of merit with its emphasis on reciprocity and collaboration that strengthen local linkages through inter-familial goodwill. Crook (1981) attributes this peaceful and cooperative manner of living to their Buddhist values – ‘...the broad thrust of Buddhist practice is to provide an experiential process whereby social stress is matched by an existential view of life in which rewards are desocialized and universalized.’ The ethic of cooperation and mutual reciprocity which pervades every aspect of Ladakhi life is also borne from the fact that the sheer ferocity of the climate for a large part of the year leads to overwintering in closed quarters from which an exit is denied.

An example of the spirit of mutual support in Ladakhi life is the institution of the *Pha-spun*. All major rites of passage like birth, marriage and death are marked by ceremonial functions that entail a fair amount of expenditure and labour. A *Pha-spun* is an association of between four to fifteen households who partake equally in organizing these ceremonies to dissipate the stress from one single family onto to several families. In a *Pha-spun* each man offers his assistance spontaneously and voluntarily, and can be sure

that, when he in turn is in need, the same help will be forthcoming (Norberg-Hodge: 1982). As will be seen in the management of irrigation in the course of the paper, cooperation underlies every task and is intrinsic to labour work.

The Traditional Irrigation System

The irrigation system in Ladakh is as much a traditional technological mastery over a hostile landscape as a fascinating case of the symbiosis between the realms of the socio-cultural and the technical. Agriculture in Ladakh is entirely governed by the season in which water from glaciers (*kangris*) and snowmelts are available for irrigation. This is complemented in some villages by water from springs (*chumik*) and marshes (*nyema*). The growing period is limited to 3-4 months of the year when the temperatures are conducive for cultivation. People over the years have developed systems of maximizing the use of the water available for irrigation. This can be seen in the physical layout of the irrigation system and in the customary rules and rights that govern the distribution of water, whether within each village or between villages.

A Description of the Physical System

Water is diverted to individual fields within a settlement through an intricate network of earthen channels. Melting waters from glaciers and snow drain into a stream or *tokpo*, which constitutes the main drainage line for a particular settlement. The water from the *tokpo* is further diverted into earthen channels called 'yuras' and further sub-divide into *sub-yuras* until they reach the fields. 'Yuras are gravity channels dug in the soil strengthened wherever required by dry stone walls and rendered semi-impervious by using fine soil or sods. Each 'yura' where it takes off has a 'raks' (crude bund or weir of dry boulder) thrown across the *tokpo* and a 'rka' (sluice, generally a gap) with a 'rka-do' (a boulder to close or open) to regulate the supply of water at its mouth'. (Dawa et al : 28). In addition earthen ponds called 'zings' can be found in every village which are used to store water, and are immensely important at times of scarcity. *Zings* have outlets for the release of accumulated water. The *tokpo* and the *zings* are most often used in conjunction to maximize the use of water. 'The actual work of irrigation consists in

damming and undamming small irrigation channels with a shovel. More than the other agricultural activities, it is sometimes done in the afternoon and evening and in fact well into the night. This results not only from the limited rota access to water but also from the diurnal variation in water flow, atleast for those villages without access to a major dam for water storage: flow in the stream is greatest in the afternoon and evening, as a delayed consequence of the sun's melting effect higher upstream' (Attenbourough1994: 369). Night water, which is in more abundant supply is diverted to the *zings* and stored there for releasing to the fields along with water from the *tokpo* during the day. In *Sabu* for instance, the distribution of water at the beginning of the season is centered around the collection of water in the *zings* and its subsequent diversion to the fields. The same practice was also found in *Phuktse*.

Norms & Practices

The people of almost every village in Ladakh have formulated detailed rules for the distribution of water through this network of earthen channels to individual fields. In some cases one or more villages are united into a single system by way of having the same *tokpo* running through them, usually lying in the upper and lower reaches of a valley. These rules have been in practice for many years, followed by each generation learning from the previous one. Interestingly, these rules have been codified into records called the *riwaz-i-abpashi*, almost a hundred years ago, at the time when Land settlement records (*bandobasti*) were being drawn up in 1908, for every village in Ladakh and which are now maintained by the *Patwari*². Prior to the annexation of Ladakh to the kingdom of Jammu in 1840, royal edicts defined the rights of water management systems for certain areas in Ladakh. Some of these royal edicts can still be found in *gompas*³ (such as *Rizong* and *Chemrey* for instance) as well as with the descendents of royal families in some villages. A study of the *riwaz-i-abpashi* for *Chemrey* and *Sakti* villages⁴

² Revenue officer appointed for each village.

³ Buddhist monastery

⁴ Based on his work in Chemrey and Sakti, Dawa has written, 'The riwaz-ab-pashi for Chemrey and Sakti was compiled during the first decade of the 20th century which is supposed to be based on the statement of village elders including the numbardaar.....'(Dawa et al)

with the royal edicts kept in the *Chemrey gompa* revealed that there are continuities between the two, testifying to the overall resilience of the practices.

The *riwaz-i-abpashi* contain details of the canals/ *yuras* and the particular fields (identified through *khasra* (plot numbers) to which these connect, the principle of water allocation that is followed within the village, sharing arrangements that exists with other villages, the rights of all categories of landholders, as well as any history of dispute. These documents were supposed to be updated every twenty years, though this never happened. One may argue after a study of the application of these irrigation norms and practices in the present scenario that the updation never took place, because they did not lose their relevance.

Principles Governing Water Allocation (Intra – village)

The agricultural season in Ladakh begins in late spring, in the month of April. This is the most critical phase of the cycle, as it is during this time when maximum scarcity of water is faced. This is the time when the ambient temperatures are not high enough to induce the melting of glaciers and therefore initial irrigation is dependent solely on snow- melt. The pre-sowing irrigation, *tha-chu*, marks the beginning of the agricultural cycle. It is only after the second watering, *dol-chu*, that glacial water becomes available increasing the quantum of water in the *tokpo*. It is during these first two months of the season that the rules for the distribution of water are most in evidence and strictly adhered to.

Equity is an overarching feature of the customary practices governing the allocation of water for irrigation in Ladakh. The social structure and patterns of land distribution, emphasis on collective choice along with the methods of allocation contribute to this.

Community Homogeneity

Unlike most parts of India, there is little social stratification in Ladakhi society. This makes for greater homogeneity within the society as a whole, which leads to a sense of equity within the system. Except for some differentiation at the extremities, according to Ferry Erdmann, ‘in Ladakh the population is categorized into a very large “common”

layer, and a very small upper and lower layers. (pp. 139) The aristocracy (*Rgyal – rig*) and their official (*Skudrag*) exist as a separate class with special privileges at the ‘top end’ while within the low-cast stratum, three hierarchically ordered groups are distinguished. These three strictly endogamous, “caste-like” groups are, from high to low: the *Mgar-ba*, the *Mon*, and the *Be-da* (Erdmann 1981:151). There are very few landless in Ladakh. It is only the Beda who do not own any land, and even in their case exceptions have been found, as in some cases land has been endowed upon them in return for their musical and other services. The existence of this large ‘common layer’ of people alleviates the occurrence of internal strife not only within a village but also between villages that have rights over the same resource.

Households and fields are interspersed in most villages in Ladakh. Landholdings are not classified according to the conventional soil quality parameters but according to the value placed by a household to its different fields within its overall landholding. The most prized is *Marzhing*, which is the best quality soil, followed by *Barzhing*, which is middle quality soil and finally *Tharzhing*, which is of poorer quality. In addition in every village one can find some *Olthang*, which is land on which *Ol*, a kind of lucern used for fodder is grown. As a result whatever principle of water allocation is followed, no particular household’s fields are favored as they all own some land of differing quality in different parts of the village. Further, this disaggregated pattern of landholding minimizes opportunistic misappropriation of water rights.

Demarcated Boundaries

The rules governing the allocation and distribution of water specify the beneficiaries and demarcate the boundaries within which the resource is to be shared. This is one of the most striking features of the rules for water distribution in Ladakh. In spite of the fragmentation of households that has occurred over the year’s water is still allocated amongst the original number of unfragmented families, which had settled in the particular village. The division of a family’s estate due to land fragmentation is not taken into account. Further, preference is accorded to *bandobasti* lands for which the rules for water allocation have been formulated. Any reclaimed land / *notor* is entitled to only surplus

water, once the *bandobasti* fields have been irrigated. However, if a household wishes to divert water to its *notor* land it may do so within its own allocated share.

Impartiality

The systems of allocation of water vary between villages but are all based on a principle of impartiality that lends to equity. The rules recognize and fulfill the water requirement of every field⁵. This unbiased approach can be seen in operation of a lottery system, by which each household's turn for receiving water is determined, as found in the villages of *Alchi*, *Shara*, *Sharnos* and a part of *Phey*. Interestingly, it must be noted that these particular villages are relatively more water stressed than the others. The lottery system is followed most stringently when there is a scarcity of water especially at the beginning of the agricultural season. Typically, the lottery entails the representation of each original unfragmented family by a particular object. The turn of each to get water is then randomly determined through a process similar to a lucky draw. Often two families are clubbed together in one or more pairs in each turn to avoid any wastage of water.

Once water is diverted into particular *yuras* from the *tokpo*, fields at the tail-end of the *yura* are irrigated first and then the ones above and so forth as water allocation is also determined by the growing period of different crops. The principle crops grown in Ladakh are barley and wheat along with peas and mustard. Wheat having the longest maturation period is sown first. Its cultivation requires higher temperatures as compared to barley. Thus fields in the lower parts of the villages are usually sown with wheat and the upper reaches with barley. Therefore, water is first diverted to the lower area of the village where wheat is to be grown. This followed by water to fields planted with peas and then barley and mustard. This system of allocation is clearly based on field situations and effectively eliminates any head-enders versus tail-enders conflict situations.

The impartiality of the system is also demonstrated in cases where a lottery does not exist but distribution takes place by rotation amongst the original unfragmented families. This

⁵ Except in times of acute scarcity when every farmer is allowed to grow only the same type and amount of crop, wherein an equal allocation of water is made.

was found in the case of *Ayu malla* in *Sabu Ayu*, which is drained by a series of springs, follows an independent system of water allocation from the other *mallas* that are dependent on the *tokpo*. Within this system of rotation equity is ensured. For example, in *Ayu* the turn to receive water first alternates between families located in the upper and lower parts of the *malla* from year to year.

Therefore, within each village the corresponding rules define a system for identifying the rotation of water, that may vary from year to year, and the method for managing and allocating the resource. All the appropriators know the rules since they have been developed internally and water is passed on from one to the next without the necessity of an enforcing agent. This CPR situation in Ladakh is comparable to the Spanish *huertas* in Valencia as described by Ostrom (1990) where ‘each farmer takes as much water as he can put to beneficial use in a defined order. Thus, each farmer has a high degree of certainty about the quantity of water to be received and has less certainty about the exact timing’ (Ostrom 1990: 92).

However, within these overarching rules there is an inherent flexibility, which accommodates practical problems that may arise in the actual process of irrigation so that informal agreements are entered into between households for exchanging turns. If a particular household for instance, has cultivated its fields with wheat and therefore needs water, it can exchange its turn with that of a family allotted an earlier turn, which does not need water at that point in time. Along with flexibility in the system for allocation of water there exists an elasticity within the CPR regime to mitigate the effects of uncertainties. It is interesting to note that water availability for the coming agricultural season is predicted depending on the amount of snowfall in early winter. For example last year in *Alchi* a major water shortage was anticipated and four *chud-pons*, one for each of the four *chusos*, were appointed instead of the usual one *chud-pon* in order to manage the scarce water as efficiently as possible. This flexibility within the system indicates that the rules are tailored to the local circumstances and can be modified within an established framework so as to adapt to their needs and specific characteristics of their environment.

Inter –village Arrangements

Not only do there exist well defined norms for the allocation of water within villages but also between villages that share the same source of water draining into a common *tokpo*, as found in the cases of *Phuktse -Shara- Sharnos* and *Phyang- Phey*. Water becomes a force of cohesion between these villages, which, though demarcated separately in government revenue maps, are geographically contiguous. As compared to intra-village water allocation, it must be noted that the allocation of water between villages, though generally conforming to the norm of equity may deviate from it in some cases, especially in the context of present times, as was found in the case of *Phyang-Phey*.

In the case of the water distribution norms for *Phuktse, Shara* and *Sharnos*, each village receives water by turn from upstream, starting with *Phuktse* and ending with *Sharnos* within a five-day cycle. Equity for tail-enders is ensured, in that *Sharnos* is entitled to an extra day and night of water at every alternate turn, as some water is lost due to seepage by the time it reaches there. The situation in *Phyang* and *Phey* is quite different. While *Phyang*, located upstream and fed by two glaciers and a series of springs, receives plenty of water, *Phey* downstream is a chronically water stressed village. Even though *Phey* is situated on the banks of the Indus, like *Alchi* it cannot afford to lift water from the river due to the absence of pumps in the region. According to the rules, *Phey* is entitled to receive water from the *tokpo* that runs from *Phyang* only from the 21st of June onwards every year, whence it may appropriate only night water. One may conjecture that this arrangement which appears to be more in favour of *Phyang*, exists because originally *Phey* was a small village and its water needs were met from the springs that drain a portion of it and partially from the river⁶. Over time as the population has grown and more land brought under cultivation, its need for water has concomitantly increased, making the arrangement for sharing water with *Phyang*, as laid out in the *Riwaz-i-abpashi*, iniquitous today. However, the original sharing arrangement to begin from the 21st of June every year seems to have kept an important factor in mind. It is interesting to take note of the fact that the 21st of June is around the time of the summer solstice, which

⁶ The fields that lay along the banks of the river Indus.

is when the nights begin to get longer, thereby, effectively increasing *Phey*'s share with time.

In the case of inter-village distribution of water two nested levels of jurisdiction can be determined— within each village and between the villages. As already described, rules for the distribution of water exist at both levels, which according to Ostrom indicates a complete system 'that may endure over the long run'. (Ostrom 1990: 102) This tenacity is amply demonstrated by the fact the traditional rules governing the distribution of water are followed even today.

The Institution of the Chud-pon

Integral and indispensable to the entire system of water allocation in the villages of Ladakh is the institution of the *chud-pon*. Deriving from the word *chu*, meaning water, the *chud-pon* is an appropriator himself⁷ in whom the responsibility for overseeing that the entire system works smoothly and efficiently as laid out in the rules is vested by the people. The *chud-pon* is appointed at the beginning of each agricultural season. The actual process may differ from village to village. In most cases, traditionally, the *chud-pon* is a respected man within the village who is known to have a thorough knowledge of the rules governing the irrigation system. His appointment is based on a collective decision in which each and every unfragmented family in a village has a voice. Water being such an important resource, it is also in the interest of each family to ensure that a competent person is selected. In fact it is mandatory at the time of appointment of the *chud-pon* that atleast one member of every one of these households be present. He is either selected on the basis of common consent as was found in *Alchi* and *Phuktse, Shara, Sharnos* or appointed by rotation from amongst the original number of unfragmented households by turn as in the case of *Phey*, and *Sabu* today.

Once a *chud-pon* is selected by the village, a document called the *kamgya* is drawn up, which codifies the collective decision of the village. The *kamgya* is like a contract between the newly appointed *chud-pon* and the village community, outlining the

⁷ Only men are appointed as *chud-pon*

responsibilities of the *chud-pon*, stating his moral obligations to his fellow villagers, in that he must be impartial, as well as mentioning the payment which he will receive for his services. A document like the *kamgya* lends a certain formality to the process, thereby ensuring that both the villagers and the *chud-pon* adhere to it. The fact that, the institution of the *chud-pon* is not vested in a single person but moves by rotation mitigates against a *chud-pon* favoring his own relatives and remaining impartial in carrying out his duties. Further, as Labal writes, ‘...water management is not a factor for the emergence of any kind of permanent authority. *Chud-pon* derive their temporary powers from the community and the responsibilities they hold do not last longer than the season of water shortage. In any case, power circulates among the households....economic and social status has no influence on water management’. (Labal 2000:182)

In villages where there is a greater scarcity of water, the responsibilities of the *chud-pon* are much greater. As in the case of *Alchi* and *Phey*, it is the duty of the *chud-pon* to ensure the physical well being and maintenance of the irrigation system in order to minimize any wastage of water. Although a *chud-pon* is responsible for the repair and maintenance of the irrigation system, he only oversees a task that is undertaken collectively by all the villagers. It is also in the interest of each family that to ensure that the physical system is in perfect working conditions as it would otherwise adversely affect their share of water. This coupled with the ethic of cooperation and mutual reciprocity that pervades every aspect of Ladakhi life mitigates free riding within the system.

The *chud-pon* also has to inform every household when its turn arrives to receive water; from then on it becomes the duty of the concerned family to ensure that water reaches their fields. Thus, the *chud-pon* as the people in one village said, has to literally ‘*sleep with the water*’, especially at the beginning of the agricultural season when maximum water scarcity is faced. In villages like *Phuktse*, *Shara*, and *Sharnos* on the other hand, the task of the *chud-pon* is limited to organizing the cleaning of the zings at the beginning

of agricultural season, and ensuring that the yuras are closed when it is the next village's turn to receive water.

Another important duty of the *chud-pon* is to mediate and resolve any minor disputes and conflicts over water that may occur in the village. According to the people, the likelihood of a dispute occurring is in fact inversely proportional to the abilities of a *chud-pon*. If the disputes are of a more serious nature then the *goba* (headman) of the village is asked to mediate along with the *chud-pon*. The *goba* may even request to the *patwari* to consult the *bandobasti* to help resolve the conflict. In the event of a really serious problem, which does not get resolved within the village, the people can refer the case to the *tehsildar* in Leh (the administrative centre of Ladakh), where recourse to the *riwaz-i-abpashi* is also available to clarify the existent norms. However, in general, the impartiality and equity built into the system as well as the ethic of mutual cooperation and reciprocity reduce the opportunities for disputes and conflicts. In addition, the power of social sanction and disrepute is enough to prevent people from stealing water or creating disruptions in the system. Thus, disputes over water are generally of a petty kind, and are resolved within the village itself with the imposition of minor penalties by the village people. Therefore, here is a unique case where the monitoring and sanctioning is mostly undertaken by the participants themselves, but may be carried out by external authorities who, however, are also dependent on the very same rules devised by the people for passing a judgement.

The institution of the *chud-pon* represents an important principle as laid out by Ostrom for the successful management of common property resources - a self-governing system without the need for an external monitor or agent. Arguing against a pure privatization model or state control as solutions for overcoming the 'tragedy of the common's', Ostrom writes, 'Many successful CPR institutions are rich mixtures of 'private-like' and 'public-like' institutions defying classification into a sterile dichotomy'. The mention of the *chud-pon* as being an important agent in the governance of water for irrigation in Ladakh, in the *riwaz-i-abpashi*, clearly breaks down, as Ostrom suggests, the dichotomy between the public and the private. In the institution of the *chud-pon* one finds a collapsing of the boundaries between community based mechanism of ensuring

conformance to norms and state imposed external control for he is in a sense, given – de jure legitimacy in the *riwaz-i-abpashi*, very much a government document. Furthermore, as the practices of allocating water between households is one which has been followed through time, developed by the people themselves, the need for an “external” monitoring agent gets minimized. As Ostrom writes, ‘The need for external monitors and enforcers is particularly acute when what is being enforced is a decision by an external agent who may impose excess costs on participants’. (Ostrom 1990: 17-18)

End Remarks

The norms governing water distribution themselves are seldom questioned. The people of Ladakh seem to have an inalienable faith in them, most clearly drawing from the knowledge that it these rules which have enabled them to make optimal use of this precious resource. What makes the traditional irrigation system in Ladakh unique is that these norms even though codified in the *riwaz-i-abpashi* are passed down from generation to generation purely through oral medium. The lives of the people are so dependent and intertwined with the system, that every person in the village has knowledge of it and the rules that govern it. Most of the villagers have not ever actually set their eyes on the *riwaz-i-abpashi*. However, they are aware that these documents exist and that recourse to them is possible in case of a dispute that threatens their age-old practices. We have in the *riwaz-i-abpashi*, a collapsing of the boundaries oft experienced between text and practice; in other words ‘*the word and the world*’.

To conclude, in the rules and practices governing traditional irrigation practices in Ladakh we find a system of operational rules devised and enforced by the appropriators. A self-monitoring system that has inbuilt sanctions, which conform to local conditions, to determine who has access and which excludes ‘outsiders’ from appropriating the resource. Conflict-resolution mechanisms exist within the system to resolve an infraction through collective decision. The most notable feature of this CPR situation is perhaps the fact that the rules devised by the people have been incorporated in the formal governmental jurisdiction, which automatically eliminates any challenge from external authorities on the rights of the appropriators. The traditional irrigation management

regimes in Ladakh therefore represent a successful and long enduring CPR institution ‘in which appropriators have devised governance systems that have survived for long periods of time in environments characterized by considerable uncertainty and change.’ (Ostrom 1990: 103). The next section of the paper will describe the impact of these ‘uncertainties and change’ of change on the traditional irrigation systems.

Section II Winds of Change

Until 1947, Ladakh had been isolated and remote region. In 1947 it was taken over by the state of Jammu & Kashmir, as part of the Indian Union. This marked the beginning of a series of changes in the region. Prior to this, its economic and cultural connections with the larger world outside, and indeed the rest of the country were few and difficult. Instead, lying along the ancient Trans-Himalayan silk route. 1947 onwards, being a border area of extreme strategic importance, Ladakh was opened and developed according to the priorities of a nation state trying to modernize itself, located within a global political economy. It has since been connected to a world based on an increasing movement of goods, services and people within and across national borders. Its earlier traditional ties based on trade through barter were terminated in the 1960s after the Chinese aggression due to the sealing of borders with Tibet. These relations based on barter were qualitatively different from the economic ties that are being forged in today’s world. This section of the paper will examine the impact of some of these changes in economic and cultural values on the traditional irrigation system, in the context of changes in the region as a whole.

Agents of Change in Ladakh

From 1960s onwards, Ladakh, which had remained unchanged for several centuries, was suddenly thrown into a time machine as if to catch up with the developments taking place in the rest of country. The transformation, taking place in the region can be attributed to three major agents of change – the military, the tourist industry and the governmental and bureaucratic apparatus.

Flanked by China on one side and Pakistan on the other, Ladakh today is a sensitive and strategic region for India. This has led to the deployment of an immense military set up in the region. While the military may appear to very much be a national force of change, its anchoring in global geo-politics must not be lost sight of. The most rapid changes began after the Chinese aggression in the early 1960s. The army moved into the region and set up camps in every major town with outposts all along the border. Around the same time the central and state governments began to establish themselves in the region. This led to the development of an entire bureaucratic apparatus, with the opening of government office's in Ladakh and consequently the introduction of conventional 'development programs'. Due to its sensitive location, Ladakh had been closed to tourists until 1974. In 1974, these restrictions were lifted, breaking as it were the final barrier to the onslaught of economic and especially cultural values from other parts of the world. The popularity of Ladakh as a tourist destination, especially for foreigners has been increasing over the years. They have brought with them a whole array of influences from the West.

In the past few decades the military set up and the tourist industry have necessitated the development of infrastructure in the region. Proper roads have been constructed to facilitate mobility, communication channels established, and new employment opportunities made available to the local people. Today, Ladakh is connected to a larger world of commodities, ideas and cultures.

The Impact of Change on Traditional Modes of Livelihood: Economic & Socio-cultural

Altogether, these three forces of change have afforded the people of Ladakh above all with a plethora of new employment opportunities and livelihood options. These have hastened the demise of certain social practices, which had been integral to the successful optimization of scarce resources in the region. Most significant amongst these have been the decline in polyandry. While in 1941 the State had passed 'The Buddhist Polyandrous Marriages Prohibition Act' that tried to legally ban the practice of polyandry in Ladakh, it did not die out in the region. It is only with the rapid onslaught of changes from the 1960s that a decline started taking place. This is because the availability of options

outside the agrarian system gave the younger brothers of hitherto polyandrous households, the opportunity to break off from the main household which depended for its subsistence solely on agriculture.

The impacts that these external influences are having on the traditional ways of life in Ladakh are apparent from the change in livelihood patterns. Crook and Shakya, who carried out a comparative study with the data collected by Prince Peter in 1938, showed this as early as 1981. They state that with the appearance in Ladakh of gainful employment as a possible alternative to self-sufficient family agriculture, by 1981 only around 50 per cent of the males continued to be agriculturists while the other half had sought employment outside the village. Peter Eppler, in his research found that ‘the influx of ideas and the possibilities to earn money have created a recruiting problem for the Gompas – additionally, more and more Lamas are leaving monasteries’ (Crook & Shakya 1983:259). This is inspite of there being a major social stigma against Lamas who leave the monastic folds to re-enter mainstream society. The term *ban-lo* is used to refer to these people and even though they may seemingly lead a normal life this ‘disgrace’ is neither forgotten nor forgiven.

Pointing out the impacts that these influxes had on the Ladakhi way of life, Ferry Erdmann writes, ‘Numerous new jobs in government services or in the tourist business provide the younger brothers with a means of independence from the family and its resources of land and livestock. Formerly they were limited to either monkhood or becoming a second husband. Now, in more and more cases, they settle into secondary houses with their own nuclear families, or take an entirely neolocal residence: for example, in or near Leh.’ (Erdmann 1983:158-159). Almost every family, even in relatively far-flung villages like *Phuktse*, *Shara* and *Sharnos* have atleast one member employed outside of the village.

It must be noted that the extent of changes seen on traditional modes of livelihood is directly proportional to the proximity of a village to Leh, which is the main commercial

centre of Ladakh⁸. This makes it easier for villages closer to Leh to access the opportunities afforded by the outside world. The changes in livelihood options are also reflected in the changes being brought about within the agrarian system. It is in the context of these that the impact on the traditional irrigation systems is discernable.

Changes in the Agrarian System

As has been seen in the case of so many traditionally isolated regions and peoples, the opening of Ladakh has led to the monetization of the region's economy. Trade in barter, has been replaced by the supply and demand linkages of a market economy, which in turn is changing the priorities of the agrarian system. Market driven demand is bringing about changes in the cultivation practices in some villages. For instance, in the village of *Sabu*, which is just a few kilometers from Leh and therefore has easier access to the market, today nearly fifty percent of their land is being cultivated with potatoes, which are in huge demand, along with other vegetables. This caters to the needs of the huge military set up, constituting a significant proportion of the market. On the demand side, easier access to goods, hitherto not easily available, has brought changes in the cultivation patterns too. For instance, in the village of *Sharnos* as flour is more easily available today, the cultivation of wheat has reduced. People today are growing more barley and vegetables.

The bearers and seekers of any change are always the younger generation. So is the case too in Ladakh. Exposed to newer ideas, lifestyles and cultures, the younger people in the region are moving away from the confined world of their village to seek out education and employment outside. This has had an impact on the labour force available for traditional agricultural activities in some villages. The most direct has been the shortage of labour especially during the harvesting season, leading to the employment of paid wage laborer's from outside the region and in the increasing use of machinery in more prosperous villages like *Phyang* for instance. The shortage of labour has also had an impact on activities such as livestock keeping. Traditionally, being the duty of the young

⁸ Leh is the commercial centre for Leh district especially, for *Zangkar* it is *Padum* and *Diskit* for the *Nubra* valley. Nonetheless it is the entry point into the region as a whole serving as the air base for both military and civilian traffic, making it a centre of movements in all directions.

in a household to take the animals to the pastures for grazing, the decline in the population of the younger generation resident within the village has led to a cutting down in size of livestock holdings. This in turn has had an impact on agrarian practices, in that synthetic fertilizers are replacing the use of animal manure. Similar changes are taking place in other more remote regions of Ladakh, such as *Zangskar* too. Writing as far back as the early 1980s about *Zangskar*, Chatterjee says, ‘.....the entry of tourists and the resultant diversification of the economy in terms of services such as guides, porters and labour in hotels, has significantly reduced the quantum of agricultural labour especially in and around *Padum*, the road terminal. Consequently large farmers have begun to hire labour during the peak season....’ (Chatterjee 1994: 789).

Innovations & Adaptations: The Tenacity of the Traditional Irrigation System

Even as the people in Ladakh are being attracted towards the greener pastures of a modern economy, they are consciously keeping alive the norms and rules which have governed the allocation of water for irrigation over the years. Despite the availability of so many other livelihood options, agriculture still remains the mainstay of people’s existence. A reason for this is that the environmental and topographical constraints prevent the growth of other basic enterprise such as industry on which people could depend on. This perhaps proves that the immediate environment cannot be overwritten by any external forces. The ‘local’ defined first and foremost, by man’s interaction with the environment is most critical. Their realization of this is reflected in the tenacity of the traditional irrigation system. This can be seen in the innovations and adaptations made to maintain certain basic rules, despite changes taking place in the values and institutions underlying them.

The increasing demographic pressure on the finite natural resources of the region has been met in two ways. Firstly, by the very forces, which have hastened the decline of certain social practices in the region – the availability of new livelihood options outside of the village. This has reduced the pressure on the limited land and water resources. Secondly, even though the fragmentation of households has led to the expansion of cultivation on reclaimed land, the boundaries of the CPR have not been changed. Thus,

unfragmented households are still the units amongst which water is allocated. This boundary maintenance can be seen in the fact that *notor* / reclaimed land is not entitled only to surplus water. This ensures that the original balance maintained between a certain ratio of land and water is not disturbed. The overarching principle of equity is maintained even today. In villages like *Alchi* where land has now being used for running shops or guesthouses to cater to tourists, no special concession is given to the extra demand for water that this may generate. These continue to receive water according to established practices.

These innovations ensure that the system continues to function smoothly and efficiently. This is most strikingly evident in the threat that the external forces of change have posed to the institution of the *chud-pon*.

The forces of monetization have not only engulfed goods but also people. Larger changes in the value attached to traditional ways of life are reflected in the process of the commoditization of the *chud-pon*. Payment to the *chud-pon*, which traditionally made in kind, has now been replaced by money. This payment in cash also extends to fines for breaking rules, earlier levied in kind. In *Sabu*, for example, if a rule is broken, a penalty between Rs. 300-Rs. 500 is levied.

The Chud-pon: An Increasingly Expensive Commodity

Over the years the prestige accorded to becoming the *chud-pon* has declined in some villages. This was clearly found in the village of *Sabu*. With other opportunities knocking at their doors, the younger generation especially, attaches less value to the privileges that a *chud-pon* traditionally enjoyed, seen in the fact that his position is no longer sought after as before. There is an increasing reluctance amongst the people to become the *chud-pon*, a responsibility which is strenuous with returns not commensurate as compared to earnings in the cash economy. Despite these above changes in perception, the importance accorded to the role that the *chud-pon* plays has not declined. Innovations have been made in the method of appointing the *chud-pon*, as people are generally not forthcoming to take up the job of the *chud-pon*. Therefore, instead of being collectively nominated, it

has now been made mandatory for every family to provide a *chud-pon* by rotation. This too has not been without its share of problems. The reluctance to become *chud-pon* on the one hand, and deteriorating knowledge of the irrigation norms, often makes it difficult to find an appropriate person. To overcome this obstacle, the people have used the very values of monetization. A household can pay another household to provide a *chud-pon*, making him a heavily priced commodity. Last year, for instance, all the four people slated to be *chud-pons* in the rotation process were not duly qualified. However, they refused to pay the required amount of Rs. 8,000 each that the appropriate persons demanded to take up their responsibility. This non-conformance by individuals, was tided over through collective action. The people of the village got together to collect the entire amount to be able to pay the competent *chud-pons*. This adaptation to changing values has happened spontaneously. The strength of the social capital found in Ladakhi society has, one could argue, won over the power of economic capital to erode certain traditional practices.

End Remarks

While discussing the changes due to external influences in Ladakh, a point to be kept in mind is the fact that these would be a lot more gradual than found in a number of similar conditions across the world. There are three major reasons for this: (a) the population is highly decentralized, (b) Ladakh is cut off from even the rest of Kashmir for eight months out of twelve (thus the change pattern is constantly broken), and (c) There are few vested interests to be accrued from the development of Ladakh – business markets are limited; exploitable resources are seemingly insignificant; and the population too small for any major political advantage to be gained. These environmental and situational constraints constitute the continuity in the face of other changes – with which the people of Ladakh have to live. This automatically necessitates the need to maintain coping strategies developed over the years as is found in the case of the traditional irrigation practices.

Conclusion

The impacts of globalization on the sustainability of the livelihood patterns and culture of Ladakh cannot be judged conclusively. On the one hand, the 'opening up' of Ladakh to external influences has improved the infrastructure in the region and has provided the people with certain facilities, including livelihood options, that were non-existent earlier. On the other hand however, there have been several criticisms, not without reason, of the impact of external economic and social values on the culture of Ladakh. Discussing the probable impacts of conventional development in Ladakh, on the basis of 'so-called development programs' in other parts of the Himalayas, John Crook, writes that 'the ideology of merit with its emphasis on reciprocity and collaboration would weaken and the old system of local linkages through inter-familial goodwill would break apart'. Tourism in the area acts as a double-edged sword too. While, those like Jina (1994) feel that tourism is an important and effective instrument for the economic development of Ladakh, especially since 'the scope for industrialization is very limited and the potentialities of agricultural development are scarce', other researchers are a lot more critical of the impact that tourism is having on the region. Peter Eppler, in his study on the impact of tourism on Leh town and its surrounding areas, found that 'most profits generated from trips to Ladakh flow into the pockets of airlines, transport companies, foreign tour operators and Indian travel agencies in Delhi and Srinagar and that the local people are receiving only a small fraction of the benefits' (Eppler 1983: 256).

These dual, and seemingly antithetical, impacts of globalization can be witnessed in the implementation of the traditional irrigation practices in the region as well. The traditional CPR institution for managing water resources has proven to be successful and long enduring. There is an awareness among the people that, given the natural constraints of their environment, the principles underlying this management regime are a foundation for ensuring optimal resource utilization. Clearly, the rules governing these traditional irrigation systems, with their inherent flexibility, are being kept intact through a conscious engagement of the people with the forces of change through innovative and adaptive methods. An illustrative example of this ability is to be found in the institution

of the *chud-pon*, which is one of the key functionaries for the successful implementation of these rules. Even though the forces of change are in a sense undermining the values, both economic and cultural, attached to it, people have steadfastly made adjustments to keep this institution alive. The situation could be likened to a game of sport, in which the over arching rules of sport constitute the structure within which the strategies used by individual players constitute the particular game (Bourdieu 1977).

Globalization may also be seen as enabling the effective management of CPRs. By providing alternative avenues for meeting livelihood requirements it mitigates the pressure of an increasing population on traditional sources of subsistence. However, considering the contingent nature of these external influences, one could also ask where ‘excess’ population go, were Ladakh to loose its strategic significance, or its allure of a tourist destination for whatever reason? If the now burgeoning population deriving its livelihood from sources other than agriculture were to go back to it, what kind of pressure would this impose on the finite resources, especially since a reversion to earlier social practices such as polyandry may not be possible. Thus, while the impact of globalization so far does not seem to point to writing an epitaph of the traditional irrigation practices in Ladakh today, any such conclusion for the future has to be made with a degree of caution.

Finally, it is not that modern values or the opportunities brought about by the monetization need to be decried – in realistic terms there is no way in which the monetization of the Ladakhi economy can be prevented. However, the positive aspects of the traditional values and practices and the role they play in maintaining the fine, synergistic balance between Man and Nature need to be recognized and evaluated while discussing any developmental plans for the region.

Bibliography

- Agarwal, A & Yadama, G.N 1997 'How do Local Institutions Mediate Market and Population Pressures on Resources? Forest Panchayats in Kumaon, India' in *Development & Change* Vol. 28, 435 – 465
- Attenborough, R 1994 'Work Patterns in two Zangskar Villages' in Osmaston & Crook (ed)
- Bourdieu, P 1977 *Outline of a Theory of Practice*. Cambridge University Press, Cambridge
- Chatterjee, S.D 1987 'Stratification and Change in the Contemporary Ladakhi Society' in Raha, M.K (ed)
- Chatterji, S. G 1994 'Socio-economic Transition in Zangskar: A Development Strategy' in Osmaston & Crook (ed)
- Crook, J 1994 'Tradition, Development and Conservation in Ladakh' in Osmaston & Crook (ed)
- Crook, J.H & Shakya, 1983 'Six Families of Leh' in Detlef, Kantowsky, Reinhard Sander (eds)
- Crooke & Osmaston (ed) 1994 *Himalayan Buddhist Villages* , Motilal Benarsidas Publishers, New Delhi
- Dawa, S., Deldan Dana & P. Namgyal Case Study on Water Harvesting Technologies and Management System in a Micro-watershed in Ladakh, India
- Detlef, Kantowsky, Reinhard Sander (eds) 1983 *Recent research on Ladakh: history, culture, sociology, ecology: Proceedings of a conference held at the University of Konstanz*
- Drew, F 1875) 1976 *The Jammu & Kashmir Territories: A Geographical Account*. Cosmo Publication
- Eppler, P 1983 'Impact of Tourism on Leh and Surroundings' Environment' in Detlef, Kantowsky, Reinhard Sander (eds)
- Erdmann, F 1983 'Social Stratification in Ladakh: Upper Estates & Low Castes' in Detlef, Kantowsky, Reinhard Sander (eds)
- Escobar, A 2001 'Culture sits in places: reflections on globalism and subaltern strategies of localization' in *Political Geography* 20 (2001) 139 – 174

- Goldstein, M.C & Tsarong, P 1987 'De-encapsulation and Change in Ladakh' *in* Raha, M.K (ed)
- Gruber, U 1983 'Man and his Natural Environment' *in* Detlef, Kantowsky, Reinhard Sander (eds)
- Hogde, Norberg H 1981 'Ladakh: Development without destruction' *in* Lall, J.S (ed)
- Jina, P.S 1994 *Tourism in Ladakh Himalaya*. Indus Publishing Company, New Delhi
- Jodha, N S 2001 'Interacting Processes of Environmental and Social Vulnerabilities in Mountain Areas' *in* *Issues in Mountain Development*, 2001 / 2
- Johnson, C 2001 'Community Formation and Fisheries Conservation in Southern Thailand' *in* *Development and Change* Vol. 32 (2001) 951-974
- Kreutzmann, H (ed) 2000 *Sharing Water: Irrigation and Water Management in the Hindukush – Karakoram-Himalaya*. OUP: Oxford, New York
- Labbal, V 2000 'Traditional oases of Ladakh: A case study of equity in water management' *in* Kreutzmann, H (ed)
- Lall, J.S 1981 *The Himalaya: Aspects of Change*. OUP, Delhi
- Moddie, A.D 1981 "Himalayan Environment" *in* J.S. Lall (ed)
- Norberg, H & Page, J 1983 'Unscientific Observations' *in* Detlef, Kantowsky, Reinhard Sander (eds)
- Osmaston, H 1987 'Environmental determinism and economic possibilism in Ladakh' *in* Raha, M .K (ed)
- Osmaston, H 1987 'Environmental Determinism and Economic Possibilism in Ladakh' *in* Raha, M.K (ed)
- Osmaston, H 1994 'The Farming System' *in* Osmaston & Crook (ed)
- Ostrom, E 1990 *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press
- Pande, U. C 1995 *Design By Experience: Hill Irrigation in the Indian Himalayas*. Joginder Sain & Bros. , New Delhi
- Raha, M.K (ed) 1987 *The Himalayan Heritage*. Gian Publishing House, Delhi

Richards, M 1997 'Common Property Resource Institutions and Forest Management in Latin America' in *Development and Change*, Vol 28

Rizvi, J 1998 *Ladakh: Crossroads of High Asia*. Oxford University Press, Delhi

Sarkar, R 1998 'Understanding Sustainability: Study of a Hill Settlement' in *Economic & Political Weekly*, October 31st, Vol. XXXIII No. 44

Sengupta, C 2001 'Conceptualising Globalisation: Issues and Implications' in *Economic and Political Weekly*, August 18, 2001

Singh, Kartar 1994 *Managing Common Pool Resources: Principles and Case Studies*. OUP, Delhi