BUILDING UPON PEOPLES' ECOLOGICAL KNOWLEDGE: FRAMEWORK FOR STUDYING CULTURALLY EMBEDDED CPR INSTITUTIONS

By
Anil K. Gupta

W P No. 1004
January 1992

INDIAN INSTITUTE OF MANAGEMENT
AHMEDABAD -380 015
INDIA

draft

Building upon peoples' ecological knowledge:
Framework for studying culturally embedded CPR institutions

Strong Tree Trunk, Weak dhruvas.

1991

Anil K Gupta

Centre For Management in Agriculture
Indian Institute of Management
Ahmedabad-380015

Paper presented at the Second Annual Conference of the International Association for the Study of Common Property, Winnipeg, Manitoba, 26-29 September, 1991.

Building upon peoples' ecological knowledge: Framework for studying culturally embedded CPR institutions

Abstract

We have earlier argued (Gupta 1990) that portfolio of activities evolved by households for adjusting with risks includes a combination of apparently rational and not so rational strategies of livelihood. The portfolio is based on resources governed by different property right regimes on one hand and ethical and cultural norms on the other. In this paper I argue that institutions for natural resource management are a part of evolutionary cultural, religious and social experience of any community. While it is inevitable that conflicts in the access to resources or their utilization emerge from time to time. These conflicts need not erode completely the network of common property knowledge systems. The conflicts and convergence may simultaneously take place along different planes and levels of consciousness. One cannot analyze resource management institutions without understanding the conceptualization of nature and repertoire of responses that a community evolves to adjust with changes in the natural phenomena.

The incidence of drought in dry regions, hailstorm or landslides in hill areas, occurrence of plant, animal or human diseases particularly the ones which are contagious (and call for collective quarantine) and any other natural calamity creates stress on the social institutions. Folk literature including riddles, songs, proverbs, adages, stories, theater and jokes provide mechanisms for internalizing certain values which in their explicit form are either difficult to imbibe or to sustain. In our anxiety to look for rules and related order we may miss the creativity that underlies the experimental and innovative mind of peasants and pastoralists in these regions.

I present in part one a framework for looking at boundaries of beliefs, eco-sociological context and institutional images for natural resource management. In part two I present instances which illustrate the creative aspect of people's indigenous eco-sociological knowledge systems (IEKS). In part three, I deal with the lessons for institution building requiring incorporation of indigenous knowledge as a building block of modern institutions. Finally issues for further research are identified.

Building upon peoples' ecological knowledge: Framework for studying culturally embedded CPR institutions[1]

Anil K Gupta[2]

Diversified uses of natural resources are an essential for household survival in high risk environments. We have earlier argued (Gupta 1990) that portfolio of activities which so evolves in an eco specific manner includes a combination of apparently rational and not so rational strategies of livelihood. Portfolio of activities is based on resources governed by different property right regimes on one hand and ethical and cultural norms on the other. In this paper I argue that institutions for natural resource management are a part of evolutionary cultural, religious and social experience of any community. While it is inevitable that conflicts in the access to resources or their utilization emerge from time to time. These conflicts need not erode completely the network of common property knowledge systems. The conflicts and convergence may simultaneously take place along different planes and levels of consciousness. One cannot analyze resource management institutions without understanding the conceptualization of nature and repertoire of responses that a community evolves to adjust with changes in the natural phenomena.

The incidence of drought in dry regions, hailstorm or landslides in hill areas, occurrence of plant, animal or human diseases particularly the ones which are contagious (and call for collective quarantine) and any other natural calamity creates stress on the social institutions. Folk literature including riddles, songs, proverbs, adages, stories, theater and jokes provide mechanisms for internalizing

---

1. Paper presented at Second meeting of International Association for the Study of Common Property , University of Manitoba, Winnipeg, September 26-29,1991

2. Professor, Centre For Management in Agriculture and Chairman, Research and Publications, Indian Institute of Management, Ahmedabad-380015

certain values which in their explicit form are either difficult to imbibe or to sustain. In our anxiety to look for rules and related order we may miss the creativity that underlies the experimental and innovative mind of peasants and pastoralists in these regions.

I present in part one a framework for looking at boundaries of beliefs, eco-sociological context and institutional images for natural resource management. In part two I present instances which illustrate the creative aspect of people's indigenous eco sociological knowledge systems (IEKS). In part three, I deal with the lessons for institution building requiring incorporation of indigenous knowledge as a building block of modern institutions. Finally issues for further research are identified.

Part-One

Boundaries of beliefs, eco-sociological context and institutional images

Ron Herring (1991) in a recent paper on politics of nature and commons dilemma shares a puzzle in a footnote,

> why do villages seem capable throughout India (and in much of the world) of collective action in cases where there are arguably no material benefits involved? That is collective religious observations are organised even in villages which fail to act collectively for production bonuses.

And then he falls prey to what I may call a `solutionist' dilemma (i.e. every puzzle must have a solution and this solution must become apparent to outsiders in the same framework in which puzzle is defined). He conjures a materialist explanation. In the local belief system pleasing deities, he avers, perhaps offers a greater material benefit than say rationally using water.

Boundaries of beliefs are often not amenable to segmentation or parcelization just as material entities can be. I can divide land or distribute water. But how do I measure and distinguish a set of beliefs which guide my actions towards distribution of water (a depletable resource) and showering of god's blessings on others. I plead with the God to debit His account and credit every body's account including mine. I do not debit my account when my turn comes for giving a contribution to

a common development fund in the village. And yet I follow an unwritten law that no marriages will be consummated within the village (adultery is possible but not the marriage). I subscribe to certain boundaries of beliefs while violating others. The explanation perhaps lies in the evolution of norms of peer approval and an essential human urge to make sense even in chaotic world.

In a Christian, Muslim or even some of the Hindu sects, prayers for only believers are valid and have social sanction. On the other hand a large part of Vedic mythology precludes prayers of sectarian kind. All living things must exist in harmony. The spirit of human, animals and plants are transmutable. The ecological consciousness pervades all relationships as far as normative belief system is concerned. The link between 'soil and soul' as Munshi put it(1951) can be mediated or pursued through a `Gospel of Dirty hand' i.e. practicing an ethic which elevates menial if it is eco-compatible and downgrades mental contribution if it is eco-alienating or destructive. Again the limits imposed by group size (which permits the fear of `what will people say' deter one from indulging in certain behaviours) also influence various kinds or layers of belief even if contradictory, to coexist. In a large village, mutual monitoring is difficult to perform. The liberty with group norms is possible. Stakes in common resources or belief sets(defined as core set of belief which are implicitly shared by most of the residents of a village) are segmented. Culture in such groups permits separation of private and public values, ethereal from material and human and animal or plant sub systems. Though even in such a village, if a common deity has to propitiated, pooling of material resources for ethereal purpose makes sense. In fact most of the social mobilizers ranging from Gokhale and Gandhi to Martin Luther King and Yeltsin have used religious symbols to seek widest possible consensus. Institutional analysis suffers when one insists on tallying the balance sheet of costs and benefits of any resource management systems entirely in material terms.

Sen and Nussbaum criticize Platonic model while pursuing ethical enquiry and advocate Aristotelian approach.

> Aristotle holds that any good account of development.... will be genuinely practical, and yet be evaluative in such a way as to help leaders structure things for the best, enabling people

> to live as good and flourishing life as possible .....we do not inquire in vacuum . Our conditions and ways of life , and hopes , pleasures, pains, and evaluations that are a part of these, can not be left out of the inquiry without making it pointless and incoherent .....Ethical truth is in and of human life; it can be seen only from the point of view of immersion.

The role of fun, playfulness, joy and pain (also see, Richards,1989, Gupta,1990) in enabling people to make sense of the uncontrollable events in life has not received adequate attention of researchers. The result is that while analyzing a boundary of beliefs we tend to assume that the meanings are resource centered and independent of other layers of consciousness a household or a group there of has.

Recent research on socialization and construction of meaning (Shewder with Much, 1991) has highlighted the role of cultural beliefs and knowledge systems that transcend the grammatical and referential aspect of language. Every discourse is believed to be

> abbreviated, condensed, and implicit (indexical) precisely because participants count on each other to count on (and can count on each other to take account of the other's counting on) context and a (presumed) shared body of prior knowledge to contribute the knowledge needed to draw a reasonable inference from what was said and what was meant.

Prior beliefs, dominant knowledge system and frame of reference can cause lot of violence to truth(as realistically perceived as possible). Herring quotes Bromely and Chapagain(1984) to express dismay over the tendency to dismiss any evidence of cooperation and not free riding around natural resources in Asian villages as `anecdotes of doubtful generality'. Authors contend that any evidence which does not tally with what theory says (that free riding is rule) becomes suspect. Herring (1991) observes,

> The reality is that both opportunism and cooperation, respect for nature and instrumental uses of nature coexist in societies of all sizes, buttressed by cultural norms and the structural conflict between economic opportunity and ecology(sic).

The earlier conjecture of Herring about existence of cooperation around religious event and conflict around natural resource management should have no more appeared as a puzzle had he not resorted to a materialist and solutionist framework. The scope for unexplained (and willingness to leave it unexplained in a particular framework) may be necessary to achieve coherence in complexity of human choices. The eco-sociological (Gupta, 1984, 1989, 1990) world view requires simultaneity,

complexity, diversity and change in resource use as an alienable feature of institutional evolution. The institutional arrangements for one purpose may sometimes help resolve dilemma in use of totally different resource. While the resources may be scattered, differentiate, fragmented and sectoralised, social space, experiential domain and ethereal boundaries are difficult to segment or separate from the very fabric of life[3].

Larry Merculieff(1990), commissioner of Sea Otter Commission, Alaska, raises a very fundamental issue about the politics of defining resource boundaries and legitimacy of a particular way of local people dealing with these. Distressed at the pitiable condition of many of the Alaska natives (considered similar to the problem of poor people in third world), he decries the tendency of Animal First activists to deny them autonomy in determining a sustainable coexistence with ecological context. He observes,

> They do not understand that in their desire to protect animals, they are destroying culture, economic and spiritual systems which have allowed humans and wild life to be sustained over thousand of years....Theirs(Animal First activists concept) is based upon a belief that animals and humans are separate and they project human values into animals. Ours is based on the knowledge from hundred of generations which allows us to understand that humans are part of all living things- and all living things are part of us. As such it is spiritually possible to touch the animal spirit. In order to understand them. Our relationship with animals is incorporated into our cultural systems, language and daily lifestyles. Theirs is based upon laws and human compassion..... Because we are intricately tied to all living things, when our relationship with any part of such life is severed by force, our spiritual , economic, and cultural systems are destroyed. deep knowledge about wild life is destroyed, knowledge which western science will *never* replace.....I leave you with this last thought-we have an obligation to teach the world what we know about proper relationship between humans and other living things.

It is this world view which is shared by the natives world over and philosophers in the east that requires attention if the institutional black box has to fathomed. The experimentation and innovation in resource use have provided the necessary variability to choose from. A recent newsletter viz: Honey bee started by us last year provides detailed empirical illustrations of low external input

3. The conflicts may exist among different social classes in perception of respective claims on a resource but these conflicts do not require assumption of absence of a common cultural space and language. The attitude towards women, for instance in a rich peasant household and a poor livestock herdsman's family may not necessarily be very different despite the fact they have very different access to survival space.

sustainable technological solutions many of which cement the concept of Knowledge as a common property institution.

The design of viable CPR institutions requires deeper study of phenomenological basis of human-nature interactions. In next part we look at some of these enigmatic interactions to explore how study of indigenous eco-sociological knowledge systems (IEKS) can enrich the studies of common property institutions for sustainable development.

Part Two

Indigenous Eco-sociological knowledge systems: metaphorical and technological innovations

Songs, fables, riddles, paradoxes and proverbs in any given cultural context provide an unique opportunity to understand the delicate relationship between the explicit and the implicit meanings. Metaphorical communication provides creative space for interpretation and reinterpretation of meanings under changing realities. The knowledge of these meanings, I contend may be an important common property institution. For understanding various resource linked institutions, the cultural institutions may provide a rich lexicon. I deal with a few metaphorical cases first followed by instances of technological and institutional innovations to make this point clear.

Case-One

Drought, hungry parrot and a woman bringing fallen grains

This is based on a Lambada (a Rajasthani migrant tribe) song sung by women in a dry village of Shimoga[4].

4. It was discovered in our action-research project on linking banking and technology on watershed basis in dry regions of Karnataka.

In a drought year, the crop has suffered very badly. A women is coming back from the field after picking up whatever grains she could. On the way she meets a parrot. The parrot starts staring at her. She asks the parrot as to why was he looking at her so intently. The parrot replies that he was actually confused after looking at the women's necklace. The necklace had a green agate stone. He mistook it to be a grain. Only when woman came closer, he realised it was just a stone. Woman asks him had he not got anything for eating.The parrot replies that hadn't she brought all the grains from the field- even the ones which had fallen on ground. The women realizes that parrot was hungry, and she also needed the grains very badly for her children. She asks the parrot to come home with her and share whatever she gives to her children. But the parrot flies away leaving the woman dumb founded.

It is also possible that parrot realized that if he delayed search for grains other people would also pick up whatever grains were left in the fields. He remembered his young ones who were waiting to be fed.

The song has several messages. It speaks about a cultural system in which the right of birds are being debated vis-a-vis the right of human beings particularly in the period of food crisis in a drought year. Perhaps there was some reason why the traditional varieties of millets or sorghum had loose set grain which was easy for birds to pick. At the same time there were elaborate designs of birds scaring devices built to reduce the loss due to bird attack. Perhaps people knew that bird would kill insects some of which harmed the crops. How much of the contribution of birds was negative or positive would be reflected in the (a) technology i.e. selection criteria of local varieties, design and efficiency of bird scaring devices, (b) the spirit of co-existence with other parts of nature, and (c) collective consciousness as well as culturally approved behaviours.

How does one interpret this song would also depend upon how one conceputalised the right of different claimants over natural resources. If birds were also considered as legitimate stake holders in the natural resources, then the viability, sustainability and effectiveness of any institution would have to be interpreted very differently. Many times, resource scientists have taken a very limited view of human nature - a view which excludes the rights of other natural beings. The conservation ethic is seldom anchored on such a view. At the same time, giving primacy to any one constituent over the rest may violate the very foundation of eco-sociological knowledge system as argued by the Alaskan leader in part one of this paper.

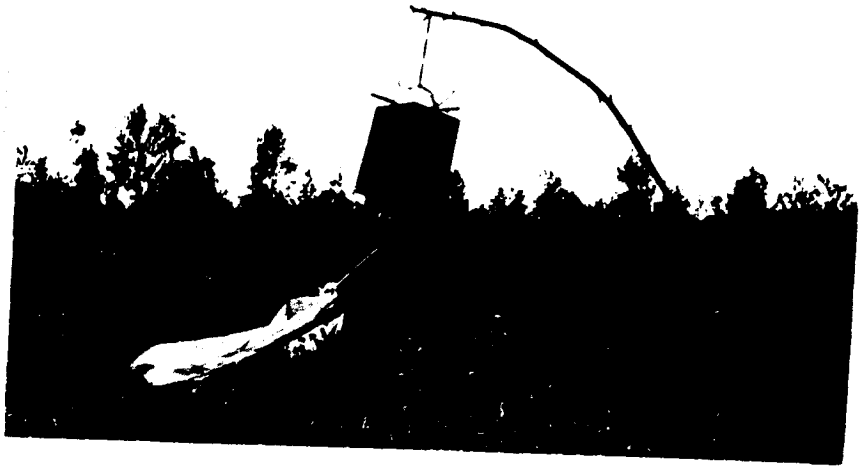
A knowledge system which generates concern for various parts of eco-system obviously could not have evolved through just the individual innovations. It would have required evolution of cultural norms, folk lores cemented by various kinds of sanctions and rewards for socially approved behaviour.

Case Two

Poaching in the desert: feeding birds as a punishment

In another case provided by Arun Agarwal (1990) a village panchayat (assembly of elderman) in Rajasthan devised an unique way of punishing person who cut some branches of trees from common land where such poaching was prohibited. The person when caught was asked to stand barefooted under open sun in the hot summer and feed the birds two and a half kilograms of grains from morning to evening. It may be difficult to establish relationship between the cutting of tree branches, reduction of bird arrival, increases in the pest attack or decrease in the bio-diversity because of lack of seeds brought by the birds and the feeding of the birds. This relationships is entirely my speculation. It is quite possible that this punishment would have been interpreted differently by different people in the village with some common meaning but some uncommon meanings too. On the one hand the culprit was punished and on the other, he was supposed to have been blessed by the Gods for having fed the birds in such an hot environment standing barefoot.

An element of ambiguity characterizing such judgments provides a creative ground for exploration and speculation. Institutions are seem to be embedded in the socio cultural and religious world view of the people. It is quite possible that access of various social groups or classes to the same common lands may not have been equitable for all the resources. However, to infer from inequity in availability of one resource, say, wild berries from common lands that inequity or indifference should exist in the institutions for other resources, be they of aesthetic or material nature would be a mistake. In this case the deliberations were guided not just by keeping the interest of human claimants on the natural resources.



Bird Scaring Devices
(Karnataka)

Case three

Algae on a lake and a forlorn woman

In a folk song of Punjab, a woman is talking to a lake while sitting under a tree. Her husband is a soldier and has gone away on a war duty. She is inquiring from the lake, tree and birds about his well-being. At one point, she asks the lake whether she would be told about her husband's well-being if she removed the algae and moss deposited on the surface of the lake.

It is possible that the lake is a common property in this village. And yet, it's maintenance as a fresh water lake would depend upon periodic cleaning by the people individually or collectively. If a researcher looked for a common property institution in the property right framework he may not find any evidence of the same. The song provides a mechanism of building individual responsibility for this purpose through generation of norms, values and cultural motifs.

Case four

Pay what you owe and graze freely[5]

It is a luyi's saying from Kenya implying a value that out of debt, out of danger. It is an ironic reply to those who refuse to participate in a common activity but are always quick to find out what took place. Perhaps, it is intended to warn the free riders.

Likewise there is a Masai saying, " Never burn a slaughtering camp once you have used"[6]. Idea is that one should not leave a bad feeling behind.

5. A K L Mirimo, Luyi's Sayings, Nairobi: OUP,1988:53

6. A Ol'oloisoi Massek and J O Sidai, Wisdom of Masai, Nairobi:Transafrica Publishers,1989

Such sayings and proverbs are intended to generate responsible behaviour among pastoralists in Kenya. Each tribe or ethnic group would generally have such a reserve of sayings. It is not always that the traditional wisdom favours the concept of knowledge as a common property. There is a Masaii saying implying that one should not expose one's source of herbs to another medicine man, only the prepared sample ought to be given.

Case five

Blending religious regulations with modern institutions (Price, 1988)

In Niger river authorities manage fishing sanctuaries (GUNTU) by secular and religious regulations. Do and Sorko are annual rituals pursued to please the river deities. Anybody who violated the restrictions on fishing in the sanctuary zones was punished by public shaming, fines, and sometimes exclusion from the regional fishing grounds. GUNTU is a particular deep section of river considered very critical for growth of flora and fauna. The river bank and under water shrines are worshiped to ensure that the deities cooperate with the people. It was realized that loud sound of on-board motors in the fishing vessels disturbed the deities. Special prayers were considered necessary to propitiate them.

Similar instances are available in Himalayan hills and Rajasthani deserts in other resource sanctuaries. For instance, in Rajasthan one finds `Auran' lands which are sacred groves left for God and Goddesses. No animal is allowed to stray into these. Even the fallen trees are not picked up, except for the funeral purposes of those whose kith and kin could not afford buying wood (Gupta, 1985).

In Malavi, large number of indigenous fruit species were found in undisturbed hilly terrain and vegetable species in low line dambos and very long undisturbed fallows (Thoma and Kwapata, 1988).

It is being increasingly realized that the role of spiritual and cultural institutions in generating respect for boundaries of common properties deserves greater attention. In times of economic and social uncertainties the religious symbols seem to acquire even added importance.

The conflict among religious and other identities have to be resolved through open negotiations rather than through authoritarian interventions. Lot of traditional ecological knowledge has been retained through codes legitimized by religious or cultural institutions. Dissanayaka (1991) has emphasized that local knowledge systems can be understood by looking at the frame of reference, process of legitimization and boundaries of network in which the knowledge is exchanged.

Case six

Quarantine as a collective institution : Foot + Mouth disease in Cattle

In Komathanga village of Wangudi, a very careful arrangement had been worked out to prevent its diffusion. If the village cattle got infected with this disease, two outposts were set up outside the village in the directions from where outsiders usually came. People from the village took turn to man these posts. No cattle from outside was allowed to enter the village lest it got also infected. Even the people visiting the village had to spend overnight at these checkposts before coming to the village[1]. This was a case where an institution had emerged not to optimise returns to individual or village. But to generate positive externality. It might be possible that if everybody reciprocated such a gesture, the diffusion of disease would of course be much lesser.

The combination of individual sanctions and collective rewards perhaps could be sustained through moral institutions and a bioethics in which long term survival was preferred over short term maximization of return.

The innovation by the peasants whether in the field of technology or institutions requires production of knowledge. But the reproduction of knowledge took place through the institutions which had to be renewed over a period of time.

Case seven

Collective vaccination and management of animals

Fulbe people vaccinated the animals against rinderpest by inserting a small piece of lung of an infected animal into an incision in the nose leaving the material in place till the wound healed up (McCorkle, 1986). Similarly, branding and venesections have been noted in literature.

Chinese encyclopedia of indigenous agriculture compiled in First Century B.C. and Sixth Century AD (translated in 1963) provides numerous examples of either animals being treated through folk medicine or their bones being used for treating different types of crop seeds by making a decoction (Sheng Han 1963). The study of dairy husbandry of nomadic gujars (Verma 1967) described several practices with regard to navel cutting, disposal of placenta or therapeutic measures against ingestion of placenta etc.

Case eight

Mobility and inter-herd disease transfer

Cultural norms can help in counteracting some of the `rational' (in short term), but non sustainable resource use strategies. A pastoral group can evolve norm of spending most time on patches with highest rate of return[2]; or can evolve norms of mobility even if resource supply did not warrant it. It could be guided by the need to avoid intermixing of yak herd with cattle herd to avoid disease transfer.

Traditionally, the yak would migrate downwards and cattle upwards on second day of the Bhutanese 4th month. The yak herd must leave about a month before cattle come up. This serves two purposes, (a) the grasses can regenerate and (b) the possibility of certain diseases being transferred from cattle to yak are minimised. Flowering of `Tseb' flower was also used as a signal for movement of yak back from lower to higher altitude [3].

Case nine

Converting problem of risk into uncertainty

Some of the hunting tribes have used a randomization rule to overcome the tendency to hunt where the maximum game is likely to be found [4]. Assume that there is a water point where animals come at a particular time in the day. `Rational' strategy might imply hunting the animals when they come there. Some tribes use different ways of deciding the direction in which to go for hunting by circulating a stone tied to sling of rope and then throwing it. In which ever direction the stone went became the direction for that day's expedition.

Such norms require that group should consider no catch or game some day with lots of catch on other days with equanimity. It is also expected that norms of sharing will emerge to take care of the bad days.

Case ten

farmer-pastoralists interactions

Mixing fluctuating scarcities with geographic diversities and resource concentration could lead to complex social structures among three groups of people in Zagros mountains of Pakistan viz. Pathan farmers, Kohistani farmers and Gujar Herders. The farmers using rich soil and water resources exchanged goods with the herders who exploited dispersed grasslands. Two of the groups shared a

resource. Gujar herders utilized Kohistani pastures in the winters when the latter fed their cattle from resources [5]. Mutual dependence among cultivation and herders in some cases could be mediated by state control as in the middle east [6]. The segmented, polycentric, integrated network on the other hand concede the autonomy of different sub groups, diversity of their goals and multiplicity of leadership or potential for leadership [7].

Case eleven

Policing crops against stray animals in Bhutan

The problem created by stray animals in the cultivated fields is very serious and a social institution called as 'Nguliawa' has developed in Bumtang to deal with it . Two or three households are elected every year as "crop police" whose function is to monitor the movements of livestock straying into crops. The "crop police" rounds up the animals caught in a field and maintains a register of estimated damage which would be compensated by the owner of the animal to the crop-owner. A part of the fines levied on the owner of the animal accrues to the "crop police" as his service charge and the remainder is paid to the injured party. The revenue from service charge increases according to the number of "catch" and the amount of fine imposed. Household which rounds up the stray animals gets a share of the fine money . Revenue for the service charges increases as the frequency of the catch increases .This feature gives incentive to the "crop police" to maximize his catch. The accounts of claims of one farmer against another and counter claims are often settled at the end of the year. Effectiveness of this institution depends upon the visibility of the valley .

Case twelve

cooperation for quarantine against human diseases

There was an epidemic in Bhutan in 1940s which disabled large number of people during the planting season. The livestock was also adversely affected. To avoid infections, elaborate arrangements were made for transporting food and other provisions. These were kept at pre appointed places

from where the outsiders withdrew. The infected people then came and collected the supplies.

Case thirteen

Pest as a common property problem

Several cases have been noted where people have realized that pest control requires collective action for both effectiveness and efficiency. In Tamilnadu, D'Silva provides an example where a voluntary organization viz., Jan Seva Mandal has mobilized children to collect the egg laden leaves for controlling red hairy caterpillar. Several other methods have been used for the same purpose. For instance, leaves of the cucumber plant sown on the field boundaries attracts third and fourth larval instar. Leaves of callotropis gigantia are spread in the fields so that the larvae of the pests collect on the same. Later, these leaves are taken out and destroyed.

In Bharuch district of Gujarat Vasava Rupaji Bhai and other farmers of village Vagalkhor have evolved a very interesting collective institution to control pests in maize crop. Five to seven persons stand in a row and keep leaves of a local plant called as *dhamas* in their bags. They start moving from one side of the field to the other in direction of the wind. On the way, they catch a few insects called locally as *sunga* from the air and crush these along with leaves by rubbing palms. A peculiar smell so emanated apparently repels the insects. As soon as the effect is reduced more insects are caught, crushed with leaves and entire village is so covered in the direction of the wind.

On enquiry, another farmer known as Botabhai located about fifteen kilometers away suggested another plant locally known as *keji* for the same purpose.

Practices of this kind provide very rich insights about evolution of transient collective institutions to take care of time and location specific problems. These technical and institutional innovations presuppose a very intimate knowledge of the ecology and pest cycles. It is obvious that any one

person howsoever resourceful cannot get full benefit of such a technology unless others cooperate. The externality of chemical pest control and high cost may deter people from attempting individual solutions. The literature on common property institutions has given lesser attention to 'episodic' institutions as against concurrent or durable institutions. Episodic institutions come into being only at the time of a crisis and the rules, boundaries and sanctions evolve for a particular period. Subsequently, the lessons are retained either in the form of myths or general folk knowledge. An important aspect of these institutions is that given changes in the environment the technical solutions have to be continually innovated or adapted. In this sense these institutions do not merely generate a collective consciousness but also reinforce an experimental ethic and an urge to treat knowledge as a common property.

Shekhawat and Bhandary (1986) have provided a rich ethno botanical account of pastoral people in Rajasthan. Several other ethno ecological accounts (Posey, 1990, Honeybee 1990, 1991) are available which need to be built upon while analyzing common property institutions.

One of the major limitations of most studies of indigenous knowledge systems (Honeybee is an exception) is that the knowledge so collected from people is never shared back with them neither for fulfilling ethical obligations nor for scientific validation (Gupta, 1987). Even acknowledgement of the name of innovators is very rare. Farmers become anonymous though a fellow colleague is always credited. With the result such studies contribute towards further marginalization of knowledge rich and economically poor populations.

Richards (1990) illustrates how Mendes people not only process a very large amount of ecological knowledge but also institutionalize some of the role models based on wild life such as elephants. How semiotic institutions interact with actual resource utilizing institutions has been shown in this study.

McCorckle (1989) makes an important point about the functions of indigenous knowledge systems in the context of natural resource management. She refers to rituals as library functions. The

knowledge is processed as an instructional routine involving encoding, transmitting valuable pastoral information, symbology, incantanation, paraphrenelia and enactment.

This is a useful insight for analyzing CPR institutions through symbolic or ritual intermediations. Box (1989) illustrates how many technological choices become feasible only because of the operation of knowledge networks. CPR institutions thus can be seen as knowledge networks involving thereby information processing routines. Since information can be processed through encounter between the process of knowing and the subject to be known (Leeuwis et al, 1990) and/or through fusion of contending horizons of different actors, the institutions provide a platform for negotiations explicitly as well as implicitly. Atte (1989) suggests that group culture underlying knowledge networks not only work as repository of knowledge but also as culture creating and maintaining systems.

Institutions which do not only generate knowledge but also generate a code of conduct can be understood and analysed by studying a nested behaviour of knowledge producing and reproducing cultures. We have several more examples in which for crop pest control, drainage management, maintaining purity of a local crop or animal breed etc., cooperative institutions have been developed by the people for common good.

Several other scholars have looked at the folk tradition of local knowledge systems (Balasubramaniam, 1986). An annotated bibliography has been compiled, entitled "Inventory of Peasant Innovations for Sustainable Development (Gupta, Capoor and Shah, 1990). Moles and Rikes (1984) argue that death of knowledge heritage either by indifference or deliberate policy may make the task of institution building extremely difficult. The right to live according to one's own world view has to be conceded to every social group.

Tradition of research into indigenous knowledge systems

Interest in indigenous innovations in Indian sub continent and China has been there for several centuries. The intensity of the interest has varied. Mazumdar (1946), traced the innovative practices regarding crop rotation, land preparation, crop-climate interactions etc., since Vedic times. Prasad (1987) looked at the theory of logic and particularly emphasized the four dimensions of time, space, mind and soul which characterized ancient propositions based on 'Nyaya' philosophy. It was recognized that without direct relationship between observer and object, the truth could not be perceived.

In more recent past Verma and Singh (1969) and Khanna (1969) provided a rich account of the indigenous innovations that animal husbandry farmers had developed in hill areas of Himachal Pradesh as well as the then Punjab. Kumar and Hiranand (1979), Gupta (1980, 1984,1987,1989), Verma (1985) PPST Madras, Dharampal (1983), Sanghi (1987) and several others have done considerable work in India on local innovations.

Nandy (1979) and others argued in late '70s that the success of technological change in high growth regions should not blind us to the richness of the ethnic basis of local knowledge systems. Studies have shown that more diverse the environment and lower the population density, greater is the need for social networking. Box (1989), and Richards (1989) argue that knowledge networks provide a platform for farmers to satisfy their curiosity about different innovations being tried by different people and not always successfully. It is important to note that communications among people about innovations very often are not purposive. In a playful and performing mood, one's curiosity is pursued alongside the other chores of life. While doing things, traveling to different places and attending marriages or social functions, one also pursues information on new innovations, ideas, seeds or ways to solve some other problems. To that extent search for innovations is a set of continuous events rather than discrete events, accidents or milestones. It is a way of life

rather than a detour or a bus stop.

The global concern for sustainable development and conservation of bio-diversity is dominated by the strategies and styles suitable for essentially the degraded environments. Since degradation in environment inevitably is accompanied with the degradation of the institutions, these policies take absence of institutions as given. Much greater reliance is placed on public interventions which in turn mean bureaucratic interventions.

Part three

Issues in Institution building

a) Building pride in local knowledge traditions: curriculum reforms

The continued functioning and the strength of the institutions, that kept the environment protected, depends on how successfully the future citizens of the country are introduced to the heritage which generates respect for these institutions . The viability of these institutions depends on the inculcation of these values in the children especially in schools.

b) The culture provides a `grammar' while technology provides new `words'. The meanings of life which is ecologically sustainable and economically just can be discovered only through blending of both. "Oral traditions", as Gold observes, "as aesthetic compositions and as cultural performances, provide substantial articulations of an indigenous perspective "(1991). A repertoire of these nature respecting traditions needs to be built as a part of developmental strategy. Adult education programmes could be built around a systematic discussions of these parable and puzzles. Collective processing of these knowledge traditions would generate new perspectives about modern problems. Since local communities and networks would have certain meanings which would be common to them as well as

some meanings which would be uncommon, the discourse would give rise to a creative situation of mutual learning.

c) Technological innovations for resource management need be inventorised and disseminated in local language so that institutional context of the resources becomes explicit.

Many times the rules governing management of resources are contingent on the choice of technology which may in turn be determined by ecological and socio economic factors. Inequity in the access to resources does modify individual incentives or disincentives for choice of technology. At the same time, the ability to innovate does not necessarily deplete with decline in social or economic status. The institutions can compensate some of the disadvantages that individuals may have in bearing the transaction costs involved in choice of group technologies. It may be useful to account for these costs (economic as well as socio psychological) explicitly so that group dynamics tries to even out individual level differences.

d.) Revival of religious identities sometimes indicates weakening of other social assurances. It is inevitable that with increase in emphasis on emotive symbols the rules become more and more positional or contingent on nature of actors. The advantage of such an institution is that policing cost may decline with increase in moral fear. The disadvatage is that the intra group differences are masked in deference to group pressures. The ecological balance is maintained but economic imbalances continue.

e.) With increase in market penetration, the weakening of moral and cultural institutions is understandable. However, market incentives can be created such that the non formal cultural channels of communication are reinforced. The role of festivals and other rituals which are eco positive can be underlined through market mechanisms. The legitimacy of such a fusion between cultural and market instruments would depend upon the nature of resource

scracity and peer approval. It is possible that the competitive prices are used to extract rent which is in turn invested in local socio cultural institutions. During our action research in Karnataka we came across several common properties such as temples, furnishing in schools, public address system in a village temple which were procured by pooling the bid or discount amount of rotating saving and credit association. Thus bidding was done on the market principles. But the rent so collected was used for a common utility. This is a fascinating area of institutional design compatible with cultural and ecological contexts.

f.) One dimension which has remained under studied relates to folk knowledge and folk philosophy. This has to be seen not merely from the utilitarian perspective but from the semiotic, value building or analytical perspective also.

The knowledge system perspective requires us to deal with not merely utilitarian, evaluative or analytic dimensions. We have also to look at cultural, spiritual and historical aspect of the technology development and diffusion both at individual as well as collective level. There is no way by which knowledge systems can grow if the traditional cultural anchors are not properly located.

To know a thing is to understand it. To understand one has to relate it to something already known, understood, labeled or named and assimilated. When something is discovered which does not tally with one's prior range of meanings or repertoire of concepts one tends to explore both within and outside. The search within becomes part of metaphysics. Search outside becomes part of socially constructed discourse in which the new discovery may be validated, invalidated or accepted as a conjecture.

The process of validation need not require exchange of ideas and information with other people within the family or outside. There are farmers who have tried new ideas but never felt excited

enough to share it with others. There are others who are known for their crazy experiments or even hypothesis. Sometimes one validates ones meaning through repeated trials. Although we have adages such as `ones bitten, twice shy' there are also adages which suggest that once is not enough. Knowledge gathering thus is a process where different branches of the tree grow in different directions but still retain connection through the trunk with the roots. The overall architecture of the tree unlike in biological species is determined by the periphery of language, culture and institutions. Thus language of fishermen or Eskimos includes large number of words for different types of sea waves or snow flakes. But the language used by the people in the mainstream living on the river basins often does not have these words. Over a period of time every language comes across concepts which had not been thought out before. That is how the languages grow through exchange of ideas and terms from other languages.

The language of innovations needs to be understood not only at the level of concepts but also at the level of a pattern of discourse. In other words sometimes same words or concepts may be exchanged very differently depending upon how and where the exchange was organised. If knowledge is conceptualised as a common property, there is no doubt that individuals developing innovations would not have much incentive to share their discoveries except if the values of the society demand such sharing and put premium on such a behaviour. A teacher not answering a question of a student, despite knowing it (but fearing that the student might not acknowledge his contribution) is unlikely to be considered a good teacher. At the same time if a teacher tries to communicate concepts suitable for a post-graduate level student to a school boy or girl, he may be considered equally incompetent.

Thus knowledge requires like a mirror, an object and a reflector but both need to be compatible. That is why some mirrors have a convex surface while other have concave or a flat surface depending upon the purpose.

Search for farmers innovations will depend upon the curvature of the mirror used by the learner.

Even if the knower and the teacher understand a concept there is no guarantee that the learner or the knower would use it. In exchange of technology, the utilisation of knowledge is often considered an evidence of suitability of knowledge and effectiveness of the communicator. Only recently people have begun to question the ides of assessing utility of knowledge by its comprehension and utilisation by the receiver. Knowledge must trigger enquiry. Inquiry which must transcend the ethical and moral boundary. Therefore, if a farmers uses high dose of pesticide and gets high yield which fetches proper prices leading to improvement in his lifestyle, such a knowledge would have been considered a case of successful generation, diffusion, assimilation and utilisation in the conventional framework of innovation diffusion. However, if such a knowledge fails to articulate questions of sustainability, questions about residual effect and their consequences for foetus, new born, adults, human being,plants, animals and other micro organisms how should one understand such a knowledge system.

Summing up

Households evolve diversified portfolios to adjust with the environmental risks. These portfolios include not merely economic investments but also social and cultural investments. While institutional analysts have tried to account for the costs and benefits of various kinds of economic investments in institution building, the cultural and religious investments and exchanges have remained largely unaccounted. The result is our limited ability to uncover episodic or dormant institutions on one hand and strengthen the declining institutions of resource management on the other.

The indigenous ecological knowledge systems can be built upon by incorporating experimental, innovative and ethical concerns of households in various regions particularly the high risk ones.

The relationship between experimentation and peer approval through knowledge networks or common property institutions needs to be further studied. By and large, the research has been focussed in describing institutions as frozen in time. The adaptation and technological innovations have seldom been systematically documented.

If we believe that research on building sustainable institutions cannot be pursued in a meaningful manner without building upon indigenous ecological knowledge then involvement of people in research process itself would be most necessary. The findings of research must be shared with the people from whom data have been collected, not only for ethical reasons but also for scientific reasons. Only when indigenous groups take note of explicit acknowledgement of our inadequacy will they offer to share with us insights and ideas that in the normal course do not make sense.

The sense making is a group process in which nested networks of knowledge of different resources and institutions interact. These interactions can be understood and measured only or mainly by looking at semiotic, linguistic, religious and social cultural dimensions of naural resource management. Meanings of most of the ecological symbols, rituals and institutions become apparent when we realize that certain values can only be retained in the form of myths. The myths act as memory cells of the organization of the social groups. However, which myths are invoked when and for what purpose depends upon the ability of groups to deal with metaphorical or analogic communications. The need for an unsaid to remain unexplained can be appreciated when people are willing to invest in long term exchanges and negotiations.

Most of the sustainable institutions require making reference to past events, stories or folk lores. Inadequacy in the current reserve of energy or momentum may often be compensated by reference to historical folk lores.

The major contention here is that traditional knowledge comprises several building blocks such as: historic repertoire of risk adjustment options, evolution of ethical norms justifying management of resources individually or collectively, concept of knowledge as common property and development of appropriate communications system, a peer group for appraisal of innovations, experimentation and revalidation of certain technological or institutional solutions. In some cases the innovations emerge because collective survival is given precedence over individual survival. In other cases innovations may be a consequence of serndipity, thoughtful evolution, amalgamation of traditional and modern materials and norms.

The institutional innovations made possible through a rich repetoire of cultural and symbolic knowledge reserve may be missed if the exsitig frameworks are not modified.

End Notes:

(1) Kinley Dorji, Agricultural Department, RGB, Thimpu, Bhutan, 1990, Personal Communication.

(2) Anthony Stocks (1987) "Resource Management in an Amazon Varzea Lake Ecosystem: The Cocamilla Case", pp. 108-120 in Bonnie J. McCay and James M. Hcheson (eds.) The Question of Commons: The Culture and Ecology of Communal Resources, The University of Arizona Press, Tucson.

(3) Anil K Gupta (1986) Socio-Ecology of Natural Stress,Technological Change and Human Response in Bhutan ,Preliminary draft ,Centre for Management in Ariculture,Indian Institute of Management,Ahmedabad.mimeo

(4) Luther P Gerlach and Gary B Palmer (1981) ,Adaptation through evolving interdependence ,In Handbook Of Oranizational Desin ,Paul C. Nystrom and William H.Starbuck(eds.) Oxford University Press,London, pp 323-384.

(5) FredriK Barth (1956), Ecological relationships of ethnic roups in Swat ,North Pakistan ,American Anthropologist 58:1079-1089 in Gerlach and Palmer ,op cit 1981:362-363.

(6) Daniel G.Bates(1974), The role of the state in peasant-nomad mutualism .In Yehudi A Cohen (ed), Man in Adaptation :The Cultural Present (2nd edition):285-296. Chicago:Aldine.

Bibliography

Aggarwal Arun, 1990. Personal Communication

Atte David O, Indigenous Local Knowledge As A Key To Local-Level Development: Possibilities, Constraints and Planning Issues In The Context of Africa. Seminar On Reviving Local Self-Reliance: Challenges For rural /Regional Development In Eastern And Southern Africa. Tanzania. pp 58,Feb 1989

Balasubramanian A.V, Tamil Folk Sayings On Agriculture: A Study of the Knowledge of Agriculture In Indian Tradition.,PPST Bulletin No.9., pp 60-89, Dec. 1986

Berkes Fikret, 1985 The Common Property Resource Problem and the Creation of Limited Property Rights. Human Ecology Vol. 13 (2), 1985.

Bonni EJ McCay and James M. Acheson (eds.) The Question of Commons : The Culture and Ecology of Communal Resources. Tucson : The University of Arizona Press.

Box, L, 1988, Networks and Nitpricks, Socio-ecological perspective on agricultural knowledge, Agri. University, Wageningen,

Crocker David A, Toward Development Ethics, World Developemnt. Vol-19,no-5, pp.457-483, 1991

Danial W. Bromley and Chapagain Devendra P,1984, The Village Against the Center: Resource Depletion In South Asia. American Journal of Agricultural Economics. December pp 868-873, In Politics of Nature: Interests, Commons Dilemmas and The State by Ronald J Herring, Cornell Universiy USA. pp 39,

Dharampal,1983, Indian Science and Technology in the Eight - ninth Century, Academy of Gandian Studies, Hyderabad, 1983, 325.

Dissanayake Wimal, Knowlege, Culture and Power: Some Theoretical Issues Related to the Agricultural Knowledge and Information System Framework. A Paper Presented at International Workshop on Agricultural Knowledge Systems and the Role of Extension, University of Hohenheim, Germany pp 24 May 1991.

Gold Ann Grodzins, Cultural Constructions of The Natural Environment In And Beyond Rajasthan, A Contribution To The Conference On Common Property, Collective Action and Ecology, CES and IIS Bangalore. P 30, August 19-21,1991.

Gupta Anil K,1981 Small Farmer Household Economy in Semi-Arid Regions : Socio Ecological Perspective, Center for Management in Agriculture, Indian Institute of Management, Ahmedabad, Mimeo. p. 452.

Gupta Anil K, 1984. Socio-Ecology of Grazing Land Management, published in Rangelands : A resource Under Siege, Proceeding of the Second International Rangeland Congress, edited by P.J. Jose, P.W. Lynch and D.B. Williams, Australian Academy of Sciences, Canberra, 1986, (IIM Working Paper No. 524, 1984), pp. 288-291.

Gupta Anil K,1985,Socio-Ecological Paradigm to analyse the problem of Poor in dry regions, Eco-Development News (Paris)32,71-75

Gupta Anil K ,1987 Musical chairs, snake & ladder and management of risks. Seminar presented at University of Munich, June, West Germany.

Gupta Anil K., and Karma Ura,1990.Blending Cultural Values, Indigenous Technology and Environment : The Experience at Bhutan. IIM Ahmedabad. Working Paper No. 883, p.42,presented at International Conference on Integrated Mountain Development, ICIMOD, Kathmandu,September 10-14,1990

Herring Ron J, 1991, Politics of Nature: Interests, Commons Dilemmas and The State, Cornell Universiy USA. pp 39, A Contribution To The Conference On Common Property, Collective Action and Ecology, CES and IIS Bangalore. P 30, August 19-21,1991

Honey Bee, 2(1) Edt. by Gupta Anil K., Centre for Management in Agriculture, IIM Ahmedabad, May 1991, 22.

Jodha, N.S. 1985. Market Force and Erosion of Common Property Resources. International Workshop at ICRISAT A.P., India. pp. 263-277.

K M Munshi, A Philosophy and a Faith, in The Gospel of the Dirty Hand, Ministry of Information and Broadcasting, Government of India, The Publication Division, 1951, 119- 126.

K M Munshi, Need for a Reoriented Outlook, in The Gospel of the Dirty Hand, Ministry of Information and Broadcasting, Government of India, The Publication Division. 1951, 45-49.

Leeuwis Cees,Long Norman and Villarreal Magdalena, Equivocations on Knowledge Systems Theory: An Actor-Oriented Critique, The International Journal of Knowledge Transfer. Vol.3,No.3, pp 19-27, Fall 1990.

Louk Box, Commoditization and The Social Organization of Crop Reproduction: Conceptualization and Cases, In Book The Commoditization Debate: Labour Process, Strategy and Social Network by Norman Long,et al. pp 100-118, 1988

McCorkle Constance M., An Introduction to Ethnoveterinary Research and Delvelopmet, Journal of Ethnobiology.Vol.6,No.1, pp 129-149, Summer 1986

Merculieff Larry, Alaska Pribilof Islands, IWGIA News Letter, no-62, pp 5-13, Decemer 1990

Moles Jerry A and Rika James V, Hope, Ideas and Our Only Alternative - Ourselves and Our Values: National Heritage and The Future of Sri Lanka Agriculture. In Gordon K Douglass(ed) Agricultural Sustainability in a Changing World Order,Boulder, Colorado, Westview Pres, 1984

Nandy Ashis. Alternative Sciences: Allied Publishers Private Limited, Nes Delhi, 1980, 155.

Norman R. Fransworth, Screning Plants for New Medicines, in Biodiversity, E.O. Wilson, National Academy Press, Washington, D.C. 1988, 83-97. of India, Scientific Publication, 1991, 231-241.

Nussbaum Martha C. and Amartya Sen, ' Internal criticism and Indian rationalist traditions ', in Michael Krausz (Ed) , Relativism, Interpretation,and confrontation (Notre Dame, IN: University of Notre Dame Press, 1989) quoted in Crocker, 1991

Posey Darrell, Intellectual Property Rights And Just compensation for Indigenous Knowledge, Anthropology Today. Vol-6,no-4, pp 13-16, Aug 1990

Richards Paul,1989 Agriculture as a performance: Farmer First London : Intermediate Technology Pub. pp. 39-43.

Sen Amartya, 1967 Isolation, Assurance and the Social Rate of Discount. Quarterly Journal of Economics. Vol. 81, pp. 112-124.

Shekhawat G.S. and Bhandari M.M, Medico Ethno Botany of The Nomadic Groups of Rajasthan Desert, Dept. of Botany, Univ. of Jodhpur, India, pp 1-18, 1986

Shekhawat G.S. & Bhandari M.M> (19) Medico Ethno Botany of the Nomadic Groups of Rajasthan Desert Dept. of Botany, Jodhpur University, Mimio.

Shweder Richard A and Much Nancy C, Determination of Meaning: Discourse and Moral Socialization, In Book,` Thinking Through Cultures: Expeditions In Cultural Psychology, Harvard University Press, London. 1991

Stocks Anthony,1987.Resource Management in Amazon Varzea Lake Eco-system: The Coaamilla Case" pp. 108-120 in

Price Thomas L, The Niger River Fisheries Project in Developing Management Measures in the Light of Local Knowledge, 7th World Congress for rural Sociology, pp 14,

Thomo M A and Kwapata M B, A Survey of Indigenous Fruits and Vegetables in Villages Around Around Bunda College of Agriculture, Bunda Research Bulletin, Vol. 12., pp 135-167, 1984

Verma, M.R. 1967 Dairy Husbandry of Nomadic Gujjars in six South-east Himachal Forest Ranges - A Study in pastoral animal husbandry, M.Sc. Thesis, Hisar Punjab Agricultural University.

Verma M.R. and Singh Y P,1969, A Plea for studies in Traditional Animal Husbandry , Allahabad Farmer, Vol. XL III (2), pp. 93-98.