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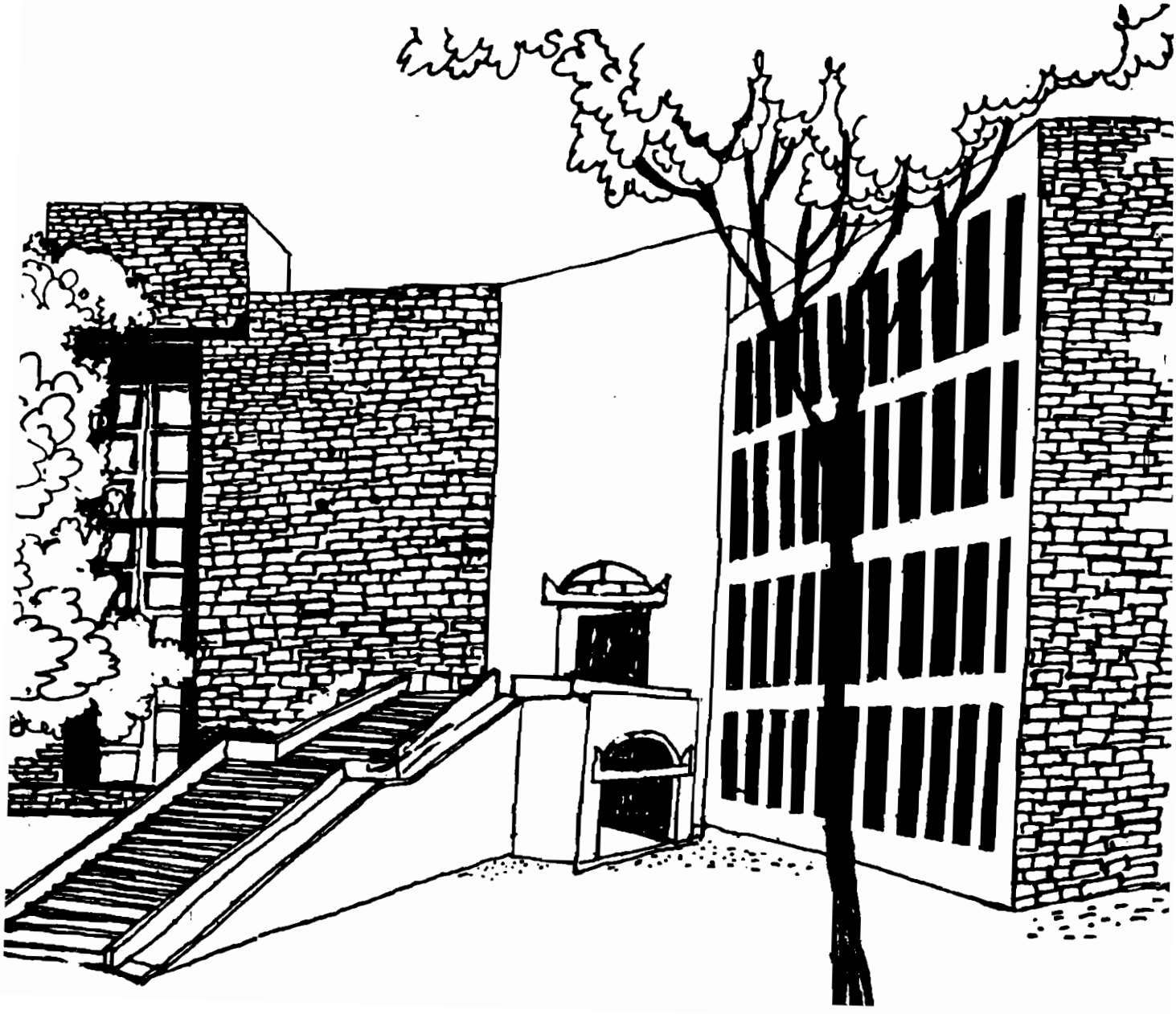

MANAGING ENVIRONMENTS SUSTAINABLY THROUGH UNDERSTANDING AND ASSIMILATING LOCAL ECOLOGICAL KNOWLEDGE: THE CASE OF HONEY BEE

By

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Abstract

Conceptually the developmental models can be arrayed on two dimensions: The time frame and decision making options or horizon. I have defined development as a process of widening the decision making horizon and extending the time frame of the households as well as the institutions (Gupta 1981, Gupta et al, 1995). The time frame refers to the period in which we appraise a technological or investment choice. The decision making horizon refers to the range of options that a decision maker is aware of and can access or avail of, in the given resource situation.

The implication is that the sustainability requires both the longer time frame as well as wide range of choices. The next question is: How do we widen the range of choices and extend the time frame? If a household does not have certainty of tenure or clarity of property right vis-a-vis a given resource, it is unlikely that the person may have a long time frame. Alternatively, in the absence of clear property rights, customary rights and informal institutions may exist and these could help extend the time frame. The cultural context, spiritual values and ethical basis of local knowledge systems also contributes to extending the time frame. That is why we notice some of the poorest households growing some of the slowest growing tree species in the homestead land. The widening of choices depends upon the (a) Access households have to resources; (b) Assurances they have about others' behaviour vis-a-vis their own as well as about future returns from present investments; (c) Ability or Skills people have to use available choices and (d) Attitudes towards nature, resource use and towards the concern for future generations.

To what extent the choices will be widened without impairing the ecological balance depends upon several factors which are summarized in part one. Several approaches to scouting innovations among children and adults are described. Seven principles of Sustainability are discussed in part two. It is concluded that while choice can be widened by the modern science when blended with informal science, the time frame can be extended by granting the right of future generations and the non-human sentient beings.

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.Managing Environments Sustainably Through Understanding and Assimilating Local Ecological Knowledge: The Case of Honey Bee

Anil K Gupta[1]

Conceptually the developmental models can be arrayed on two dimensions: The time frame and decision making options or horizon. I have defined development as a process of widening the decision making horizon and extending the time frame of the households as well as the institutions (Gupta 1981, Gupta et al, 1995). The time frame refers to the period in which we appraise a technological or investment choice. The decision making horizon refers to the range of options that a decision maker is aware of and can access or avail of, in the given resource situation. We can see the four possible developmental scenarios through combinations of these dimensions (fig.1).

Development Models

		Time frame	
		Short	Long
Range of choices	Narrow	Non-Sustainable	Vulnerable
	Wide	Opportunistic Weak/No sustainability	Sustainable

Fig.1

The implication of the above figure is that the sustainability requires both the longer time frame as well as wide range of choices. The next question is: How do we widen the range of choices and extend the time frame? If a household does not have certainty of tenure or clarity of property right vis-a-vis a given resource, it is unlikely that the person may have a long time frame. Alternatively, in the absence of clear property rights, customary rights and informal institutions may exist and these could help extend the time frame. The cultural context, spiritual values and ethical basis of local knowledge systems

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also contributes to extending the time frame. That is why we notice some of the poorest households growing some of the slowest growing tree species in the homestead land. The widening of choices depends upon the (a) Access households have to resources; (b) Assurances they have about others' behaviour vis-a-vis their own as well as about future returns from present investments; (c) Ability or Skills people have to use available choices and (d) Attitudes towards nature, resource use and towards the concern for future generations.

To what extent the choices will be widened without impairing the ecological balance depends upon several factors which are summarized in Part One. Seven principles of Sustainability are discussed in Part Two. A short summary is given in Part three.

Part One

The concerned choices: Lessons of Honey Bee experience

1. The erosion of knowledge is a greater and more urgent risk than the erosion of just resources.

There has been a widespread concern and rightly so that natural resources are getting eroded very fast. However, this concern has often been converted into activities and investments which are focussed only on resources. The knowledge that people have accumulated for conserving these resources over many generations has not been given adequate attention. The Honey Bee Network was started about six years ago primarily to arrest the erosion of ecological and technological knowledge but also to document and disseminate the contemporary innovations produced by people for sustainable natural resource management. We have been trying to ensure two basic values while pursuing these goals.

a. That when we collect knowledge people, they don't complain just as flowers don't do, when honey bee collects their pollen.

b. We connect farmer to farmer which is only possible in local languages just as honey bee does by pollinating flowers.

Honey Bee Network now extended to seventy five countries is today one of the world's largest networks of indigenous innovators. We realize that knowledge of people whether traditional in nature or contemporary in origin will be lost, if not helped to grow through experimentation, value addition and dissemination. The inter generational gap makes the erosion of this knowledge even more serious problem.

2. Conservation through Competition

We set up a developmental voluntary organization viz., SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions) to strengthen the Honey Bee Network and pursue research, action and advocacy around the issues of knowledge and resource rights of people. We have been organizing several kinds of competitions among young students, adults, scholars, public administrators, grassroots functionaries, farmers, etc. I describe below each of these competitions briefly and invite you to not only join hands but also participate in the ones that are applicable to your interest and category. Let me add that while we respect the spirit of cooperation a great deal, we also feel that the spirit of competition to produce excellence is compatible with the spirit of cooperation. I

also invite fellow scientists to consider other ways in which the competitive excellence can be generated at all levels to bring out the best in our society so far as strategies for natural resource management are concerned.

a. Biodiversity contests.

The idea in this contest is to encourage children in the primary education classes (from 1st to 7th) as well as at other levels to look around themselves and collect knowledge about plant biodiversity to begin with along with its uses. On a given day, in the presence of a jury comprising local teacher, voluntary worker, herabilist, etc., each child brings the list of plants that they know about with or without uses in addition to the samples of the plants that they can identify. They are evaluated on the basis of five parameters: (a) number of plants listed, (b) number of plants brought (c) awareness about habitat (d) familiarity with uses and (e) style of presentation. Those who excel are given prizes apart from certificate of honour. Many children would ask their parents and more often their grand parents. In the process knowledge transfer would take place. We have noted that children do not compete only to win. Many times, some children bring only one or two leaves. Obviously they have no hope of winning the competition and yet the spirit of participation seems more dominant. In another study we noted that the ecological knowledge and academic excellence were not necessarily correlated (Shukla, Chand and Gupta, 1995). This study also indicated that children from backward and scheduled castes knew twice as much about the plant diversity as children from higher castes. Further, the girls did not have any disadvantage vis-a-vis boys upto class 4th, but after that there was a marked decline in their knowledge apparently due to increased household chores. The reason why lower caste children knew perhaps more could be because of their greater dependence on natural resources for their survival.

These competitions can also be organized among students at higher level to understand the potential of embedded ecological knowledge. What has struck us most is the irony inherent in this process of learning. On one hand the children identified through these competitions having excellence in ecological knowledge have to learn `a' for apple and `b' for bird. Otherwise, they become part of a large pool of so called `unskilled' labourers. On the other hand, we train students having no background in natural resource management in the field of ecology, botany, taxonomy, etc. Why couldn't we help these young ecological geniuses to grow as naturalists?

b. Competition for scouting innovations by farmers, pastoralists, horticulturists, fishermen and women, etc.

We have been documenting indigenous innovations by farmers using local biodiversity for developing non-chemical sustainable technologies for agriculture, livestock, fisheries, agriculture and food processing, etc. Today we have one of the largest data bases in the world on farmers' innovations with names and addresses of the innovators/communicators of the ideas where these are drawn from traditional knowledge systems. These innovations have been collected from different parts of the world but mostly from India and within India from Gujarat. More than 2000 villages have been surveyed with the help of under graduate students in summer vacation. Other nodes of the network are active in Tamil Nadu, Karnataka, Andhra Pradesh, Gujarat, Bhutan and Colombia. In addition to documentation of innovations through the students, we also organized state wide competitions among grassroots functionaries as well as farmers in Rajasthan and Gujarat. The initial results have been extremely encouraging. What we have done is to circulate forms through state government to various districts, talukas and villages seeking information about traditional ecological knowledge as well as contemporary innovations. Large number of examples have come out where farmers have developed herbal pesticides, veterinary medicines and growth regulators, etc. It is true that in most cases the scientists in formal

labs have not given adequate attention to these innovations. But, farmers have taken up experimentation in informal labs at their forms nevertheless. We have also been collaborating with Gujarat Agric. University, Jai Research Foundation, LM College of Pharmacy, Indian Institute of Science, MS University, Baroda, etc., in order to add value to peoples' knowledge systems. Our goal is to develop such products which can be either commercialized or disseminated directly among the farmers to reduce the costs and move towards non-chemical sustainable agriculture and resource use. We realize that this transition is not going to be easy given the massive influence chemical pesticide and other input industries have on the public administrators, policy makers and the scientific establishment. And yet, we are confident that through the coalition among public spirited scientists, grassroots innovators, and conscientious entrepreneurs, value added products can not only be developed and commercialized. The part of the profits so generated will need to be shared with the innovators and part with the research institutions/networks so that this coalition can evolve and survive through its internal dynamics. The fate of coalition will not depend upon the benevolence of bureaucracy or aid agencies. The science and technology establishment in the country has not even started thinking in these lines. One evidence of this indifference is the absence of a venture capital fund for small innovators in our country.

The competition for scouting innovation also helps in reorienting the thinking of the grassroots functionaries. Instead of focussing on lab to land approach, they begin to see the importance of land to lab to land. Further, the developmental alternatives are explored in terms of what people have and not what they do not. As a consequence, the process generates humility and respect for indigenous innovators.

c. Involving innovators as researchers

Several artisans as well as innovators who have developed innovative uses of local biodiversity and other materials were requested to scout around for people of their kind. This process has generated a very participative way of learning from local innovations. In some cases, innovators so discovered would perhaps remain inaccessible by any alternative method.

d. Institutions for conserving, regenerating and diversifying biodiversity.

Honey Bee network has been building three kinds of data bases. one indigenous technological innovations, second on institutional innovations and third on literature on indigenous ecological knowledge systems. The institutional innovations are no less important than the technological innovations. In fact, one could argue that without understanding the institutional context of technological innovations, we cannot speculate on the scope of sustainability.

To illustrate, a recent case of Thakuva village of Banaskantha District could be cited. In this village the common land of about 200 acres was quite degraded. Many people in the village had encroached upon it. In the neighboring village on the Rajasthan side, there was an excellent auran land, i.e., land left for God and Goddesses. The local institutions required that nobody would take the wood from the auran land unless somebody is destitute. Even in such cases, the dead wood is taken for the funeral pyre purposes of those whose kith and kin cannot afford to buy the wood. The result is that one could see the dead wood lying around with grass growing on it. Balvantsingh, the leader of Thakuva felt that the common land of their village should also be regenerated. Similarly, as was the land in Rajasthan village. He requested those who had encroached the common land to vacate it. He pleaded with them for several weeks with no result. Finally one day, he decided to declare to the entire village that he had encroached all the remaining land of the village. He refused to allow anybody to take their animals for grazing or drinking water in the common land. By evening the animals were thirsty and hungry. All the villagers then

decided to pressure on the encroachers to vacate the encroachments. Balvantsingh took everybody to a temple and they had a meeting to evolve norms. They decided that henceforth nobody would graze their animals for two months after the rain and in the remaining part of the year they would graze but not cut trees. Anybody observing anybody else cutting a tree, would be considered equally guilty. Accordingly, the common property land in the last eight years has regenerated in a very big way. People go for a collective patrol periodically and monitor any attempt to encroach by people even from neighboring villages. They have decided that anybody caught poaching would have to contribute 30 Kg of grains to the common bird feeding centre. In case somebody persistent with the offense, he or she would be outcasted and nobody would keep social relations with that person.

There are many other examples where contemporary institutions have evolved rules to manage common property resource in a creative and innovative manner. Sometimes these institutions are folkloric in origin. Sometimes these are traditional institutions governed by historically evolved norms. There are also cases as described above where traditional institutions broke down and through some social entrepreneur new institutions have emerged.

The most important aspect of institutional regeneration or renewal is the long term sustainability of a natural resource. The lack of institution building has been the single most important factor responsible for decline of watershed projects as well as other communities afforestation projects after a period of time. Essentially, there are four dimensions of institutions building. First the issue of boundary management, i.e., consensus about who is in, who is out. We could also call them as access rules. The second aspect is the allocation of resources in terms of who gets what, when, how, etc. This requires some norms for regulating inter-personal access and also for maintaining the resource use. In the absence of regeneration and value addition, mere distribution of what exists is unlikely to provide incentives of long term cooperation. The third aspect is conflict resolution. How do we resolve the conflicts about access, resource allocation, value addition, etc. The conflict resolution systems are unlikely to be sustainable if these don't build upon multi enterprise multi level involvement of households in different portfolios. The fourth dimension relates to leadership which has to assure the group about complaints of norms and generation of new agendas to keep up the motivation of the group. The ethical aspects of access, assurance and ability (skills) of people obviously impinge on the viability of institutions. The long term sustainability is unlikely if the interest of only human beings and that too of only present generation are taken into account. The responsibility towards next generation and towards the non-human sentient beings cannot be ignored in any institutional arrangement.

e. Linking formal and informal science for generating incentives for conservation.

Peoples' knowledge systems about natural resources is not only multi functional but also multi dimensional. Tulsi is revered as a sacred plant but it is also found useful for various purposes in human, livestock and agricultural systems. Sometimes, the scientific mind refuses to take note of the sacred and insists on dealing with only the secular aspect of knowledge systems. It may not pose any problem so long as the secular aspect of knowledge system are considered independent of the sacred aspect. I have argued that just like a double helical structure of DNA, the secular and sacred are intertwined. The sacred space provides identity to nature in which eco centric view can override the anthropocentric view. The secular knowledge system generally provide for the priority for human preferences in dealing with nature.

The nature of research that people do in linking cause with effect may not necessarily meet all the conditions of formal science. However, the indigenous taxonomy, clouds, soil, winds, waves, etc., do provide us new ways of looking at survival options under environmental stress conditions which do not necessarily emanate from the formal scientific

categories. Blending of formal and informal science is a natural corollary of blending secular and sacred though not always in a straightforward manner. For instance, one can develop a drug from a plant used by a native people for a given purpose disregarding the sacred aspect of the knowledge system. However, the anthropocentric view cannot offer guarantee the fact the plant will always remain available. For continuance of biodiversity, blending of secular and sacred consciousness is inevitable.

I summarize seven principles of sustainability including the six dimensions of bio-ethics to conclude how Honey Bee approach provides a new perspective in this challenging task.

Part Two: Seven Steps to Sustainability: learning from Indigenous ecological thought

a: Sustainability of Spirit is the key

Even if we have technologies which can help in use of resources with in sustainable limits, will appropriate institutions emerge if the spirit is absent? Such was the question posed once in an Indian epic, Ramayana. In this epic, Lord Rama symbolizes the Dharma (noble conduct) and Ravana (who otherwise was a very wise sage) the Adharma (bad conduct).

> Ram was very frustrated on knowing that his wife, Sita (abducted by Ravana) was just on the other side of a vast expanse of water and he didn't have wherewithal to cross the sea or build a bridge. His followers were equally restive. The task appeared impossible. Suddenly a ray of hope emerged.
>
> Ram observed that a squirrel was behaving in an odd fashion. She was wetting her tail in water, coming back to the shore, rolling in sand and going back to the sea and washing her tail. She was doing it repeatedly and almost furiously. As if in a great hurry. Ram called that squirrel and asked her the reason for her odd act. She replied that knowing the challenges before them, she was contributing her mite. She was trying to fill the sea by the sand attached to her tail so that a path could be built.
>
> The entire work force of Ram felt ashamed at their despondency. And soon, with their collective effort, the path was built.

The projects like the squirrel's efforts are seldom sustainable. But a non- sustainable act like this could inspire a sustainable process. The trick thus is to unfold the locked up entrepreneurial energy of all those around. The momentum so generated may eventually solve the problem or generate the ripple which unsettles those believing in maintenance of status quo. The spirit of sustainability is prior, the substance is subsequent.

b: Sustainability requires acknowledgement of rights of the `Others'- the sentient beings(birds, beasts and unborn human and non human life)

In most societies and cultures, strands of philosophy are found which justify the rights of the 'perfect strangers' like the unborn and other living forms which provide the much needed biodiversity. It is necessary for us to understand the process through which such a consciousness is ingrained in the day to day use of resources and observance of bounda-

ries. A folk song I heard (as a part of our discussions in an action research project on watershed management in Shimoga district of Karnataka state in south India) suggests how societies have kept the germ of this consciousness alive.

Paradox of Parrot:

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 realizes 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.

Why did parrot fly away? Did parrot realize 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. Did he think that poor humans were so meek and weak that they could search for grains only in a limited space where as he could fly over long distances. He should thus leave the grains for the poor woman. May be he thought, he had right over the grains so long as these were in the field. Once these were in the hands of a human being, she had the right over it (an instance of superior ethic than the one we humans use!). There could be many other interpretations.

The song speaks about a cultural system in which the right of birds are being debated vis-a-vis the right of human beings even in a drought year.

How does one interpret this song would also depend upon how one conceptualizes 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 modern conservation ethic anchored on such a view can seldom produce sustainable outcomes.

c: Sustainability through creative culture bound indigenous institutions of management of Common Property Resources(CPRs)

Most of the sustainable arrangements for natural resource management require group action through some kind of CPR institutions. While many of the available frameworks of analyzing such institutional arrangements have emphasized either game theoretic or utilitarian perspectives, I stress the need for giving importance to the process of rule making as much if not more than the rules per se. Further, I also feel that there is an admixture or what I may call double-helical intertwining of explicit and implicit, secular and sacred and `this' and the `other' worldly consciousness in these indigenous institutions.

Feeding the birds for poaching the trees:

A village panchayat (assembly of elderman) in Rajasthan devised a unique way of punishing person who cut some branches of trees from common land where such poaching was prohibited. The offense was discussed by the village assembly of elders. Hours of discussion about various issues follow such as: when did such an offense take place last time; what were the choices considered then; did the culprit commit any or similar offense earlier; etc. The punishment given was to ask the culprit 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 (Agarwal, 1990).

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 relationship 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 seen 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 in view.

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. The case given above questions such a bias.

<u>d: Sustainability through multi-functional institutions of restraint, reciprocity and respect generating collective responsibility for nature</u>

There is a custom that people go together to the forest for collection of shingle wood in Bhutan on a particular day. There are several implications of this practice.

a) While collecting wood on the steep slopes, if somebody falls down, there are people around to help in the emergency.

b) Everybody monitors everybody else's collection of wood.

c) Since collection of wood has to be done keeping in mind the age, health, and condition of the tree, corrective restraint helps in maintaining those conditions.

d) Some people are either too old, handicapped, weak or their requirements are larger than they can manage on their own. Groups help in such cases and carry the extra burden.

e) There are sites which might have suffered some damage due to rain, landslide or otherwise. Since such sites are observed together, it enables mobilization of the collective will for corrective action more easily.

f) In addition to the utilitarian dimensions mentioned above, the group action is its own reward when there is music, fun and laughter around.

Thus, emphasis on only the economic part of a resource would not provide sufficient information or insights for building institutions that can help in managing resources sustainably. Development is possible only through creative institutions which constrain individual choices to some extent and yet provide scope for entrepreneurship.

e: Sustainability through blending of holistic and reductionist perspective for regenerating resources

I intend to take help of a story from another epic of India viz: Mahabharat. There was a famous Guru (teacher) who had an ashram(college) situated in a forest specially meant for royal scions. His name was Dronacharya. Five brothers (sons of the king Pandu) were his choicest students. Since Droanacharya was the best known teacher of the art of Archery, his students were supposed to share this excellence too. Once he took all the five brothers for an examination to a nearby place. He hung a bird on the tree and asked each one of them one by one to take an aim at that bird and tell him what did they see. When the turn of the eldest brother (Yudhister) came, he said that he saw the entire cosmos of which the earth was a part, of which the tree was a part and finally he saw bird on the branch of that tree. Dronacharya asked him to sit down. The next brother came. He said that he saw he earth, tree, branch and the bird. He was also asked to sit down. Then came the turn of his favourite student Arjun (the hero of the famous story of Gita). He could see only the eye of the bird. Undoubtedly, he became the best known archer of his time (surpassed only by a tribal student Eklavya who was denied admission by Dronacharya to his Ashram since he was a commoner).

The bird of the eye reflects the extreme reductionist attitude just as the whole cosmos shows the holistic perspective. My contention is that we need both the perspectives i.e. reductionist as well as holistic, and not just any one as many environmentalists claim. Any theory building process requires drawing a boundary which renders the phenomena being studied as partial. On the other hand we need holistic view so that interconnections of different parts of nature can be seen. Sustainability requires balancing the sea saw of these two ends of the same spectrum.

f: Bio-Ethics for sustainability:

The sustainability of a resource use requires development and demonstration of an ethics which guides decisions regarding current versus future consumption of resources. The conception of nature and relationship between human and non-human, animate and inanimate, born and unborn etc., are defined if not determined by this ethics. The bio-ethics can raise following choices:

a) Do I draw natural resources at a rate that the resource renews itself within a short cycle.

b) Do I draw as much as I can till it is available and once exhausted, I shift or change the resource base.

c) Do I draw less than what can be used without impairing the ability of resource to renew itself.

d) Do I draw resources only as much as I need simultaneously ensuring that the genuine needs of others are also met and the resource is renewed before it drains down to its critical limits.

e) Do I draw as much as possible, hoard it if feasible and then market it at a very high price to ensure some kind of rationing of its use.

f) Do I develop an institution which through its inefficiency (or coercion, or both) generates a constraint on the maximum sustainable yield.

These vectors of human choices confront every decision maker involved in resource restoration. To what extent these choices actually influence the design of organizations is a matter to be pursued further.

One of the persistent reasons why many externally induced intervention fail is because the local knowledge system is often discounted and if considered, is seen only in an utilitarian perspective(Gupta, 1980, 1981, 1987, 1989; Richards, 1989, 1985, 1992; Verma and Singh, 1969; Dharampal, 1971; Chambers, 1983; Bebbington,1992; Periera,1991). This realization has dawned on the development planners now for some time but the mechanisms chosen to build upon local knowledge are often worse than the problem. Various short cut methods popularly called as rapid rural appraisal (RRA) are invoked to get a handle on local situation. We have critiqued these methods on ethical as well as efficiency grounds separately(Gupta and Patel,1992). It is necessary to note here that organizations of creative people whether in the form of networks or informal cooperatives or just loose associations would generate a very different pressure on society for sustainable development. The spirit of excellence, critical peer group appraisal, competitiveness and entrepreneurship, so vital for self reliant development may emerge, to our mind only in the networks of local `experts', innovators and experimenters. It is true that every farmer or artisan does do experiments. But not every one is equally creative and not in the same resource related fields. The transition of developmental paradigm from *Victim's* perspective to that of the *victor's*. The organizational principles for a creative group are also likely to be different than for the rest.

The organizational principles which guide collective action in different regions would obviously have some common but many uncommon dimensions.

The Institution Building process involves simultaneous intervention in eight dimensions of organizational change, Viz: Leadership[2], Stake Building[3], Value Reinforcement[4], Clarifying Norms and rule making process[5], Capacity Building[6], Innovation and creativity, Self -Renewal[7], and Networking. Theory of Institution Building[8] (IB) has to be significantly remodeled because of historical reasons. The IB processes were evolved to increase the capacity of third world organisations to receive funds/aid and use it efficiently and effectively. The problem was defined from external perspective and resolved or sought to be resolved accordingly. Such a perspective provided only limited insights for strengthening the capacities of organizations which have emerged autonomously at local level.

Part Three: Summing up

Sustainable management of natural resources requires, as I argued in the beginning, widening of decision making choices and extending the time frame. The utilitarian logic by itself is unlikely to provide the long time frame necessary for the purpose. Similarly, decision

2. The iterative, rotational and interactive leadership models are the only ones which sustain local community organizations. A study of Chenchu food gathering and hunting tribe in Andhra Pradesh (Gupta, 1983, 1987) revealed three principles of sustainable organizational sustenance; First) The leader and follower can iterate. The leader in honey collection sub-group has no particular skill in hunting group and becomes just a follower in that group. Second) The skills and not status determine the leadership(the person who knows the most critical functions in a task becomes the follower rather than the one who is chief of the tribe or his kin. Third) the pooling is independent of the redistribution. The honey, game, food, fish or fuel is shared in this tribe among all the members and not just the one who went on the expedition.

3. The orginal model of IB which emhsized on the intr-organizational changes is less useful now. The evolution of stakeholders' interest in the organization plays a vital role in the self reliance process.

4. Some values are brought by the members of any organization along with them but some are acquired in the org zational life experience. It is these values which have to be so shaped that reliance on external instruments control and supervison becomes less important.

5. The rule making process is the one of the most crucial aspect of the IB in any organization. The fine tuning of rules, norms and belief system in accordance with the strategic future directions is not a function of just the leader. The group has to collectively evolve the norms and changes there in so as to ensure that collective spirit is maintained.

6. One of the most inappropriate term in the developmental jargon is the `unskilled` labour. There is practically no person who has no skill what so ever. The challenge is to provide space with in and outside the organizations for each member to grow. The learning systems at individual and collective levels are to be strengthened in such a manner that the errors are not masked and corrections are not delayed too much.

7. The process of self renewal requires recalibrating the scales of measurement periodically. It is the ability to discriminate finer shades of the colour of life which in the normal course may be missed. The historical perspective helps just as does the urge to relate to larger social causes. One can not discover the immense source of energy to pursue any specific goal till one finds the broader dimension of growth.

8. Several reviews exist elaborating the concerns in the matter but within the externally aided process of IB (Uphoff, 1986; Wildavsky, 1978, pareek, 1981;Laudu, 1972; Essman, 1972; Ganesh, 1980; Sachdeva, 1981; etc.). Gupta, 1982 a, b, and Pastakia,1992 discuss the IB process from within.

making options cannot be widened without bringing in the tools and techniques that are available in modern science. Thus, while choice can be widened by the modern science when blended with informal science, the time frame can be extended by granting the right of future generations and the non-human sentient beings.

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