

**Compensating Local Communities for Conserving Biodiversity:
Shall we save the Goose that laid the Golden Eggs so long?**

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IIMA Working Paper No.1206
August 1994

The main objective of the working paper series of the IIMA is to help faculty members to test out their research findings at the pre-publication stage.

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Compensating Local Communities for Conserving Biodiversity: Shall we save the Goose that laid the Golden Eggs so long?

Anil K Gupta¹

Large number of local communities across the world have shared unhesitatingly their knowledge about local biodiversity and its different uses with outsiders including researchers, corporations, gene collectors and of course, activists. Many continue to share despite knowing that by withholding this knowledge they could receive pecuniary advantage. As if sharing was not enough, large number of herbalists does not even accept any compensation when offered. In some cases they have cultural and spiritual taboos against receiving compensation because of the fear that effectiveness of their knowledge would cease if they received any payment for it.

Some insist on a transfer payment or some kind of offering to be made to birds, dogs, other animals or just to nature if the given remedy worked successfully. There are cases when the scale of offering is proportional to the capacity of the person being helped and not the degree of help. In such a case the people are not opposed to charging for their services. It is just that they are not charging for themselves. The cultures that put restrictions on being compensated may in fact have mechanisms of compensation but favoring nature and the other sentient beings.

It is in this backdrop of ethical and ecological concerns of local communities and herbalists that we have to discuss the issue of recognizing, respecting, and rewarding the contribution of local communities. The challenge becomes even more difficult when we realize that many of these communities do not have access to some of the basic needs and are quite impoverished.

We do not see this world as very strange in which an ethics favoring people to share their knowledge without receiving any compensation becomes responsible for individual as well as collective poverty. It is obvious that this ethics cannot be priced. The contribution to conservation may be to some extent.

Therefore, the possible ways of compensating local contributions that I deal with in this paper do not cover all the contributions. We can merely compensate an act of exchange but an act of faith that provides incentives for entering into exchange (often one way) cannot be valued, much less compensated.

Given the fact that majority of the poor people occupying least income niches in urban or developed areas hail from drought prone areas, forest regions and hill areas cannot just be a matter of chance. There is a very systematic pattern in the movement of people from biodiversity rich, economically poor regions. In a world where such an ethics has no value, the only way markets deal with these people is by classifying them as 'unskilled' labour. Some of the official plan documents have in fact gone to the extent of suggesting that one should not try too much to stem the migration of people out of the less developed region, lest the supply of cheap labour for infrastructural project becomes difficult.

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After GATT and Rio treaty, sensitivity on the subject has certainly increased. It is being realized that biodiversity cannot be prospected or used without making the conserving communities and innovative individuals the stakeholders in any plan for adding value to the resource. This realization has been articulated in FAO undertaking on plant genetic resources through a recommendation of international gene fund in the name of Farmers' Rights. This will be administered by an international civil service for distributing so generated resources to various governments for conservation purposes. Rio treaty provides under Article 8J a condition for *involvement and approval* of local communities conserving biodiversity ensuring in the process an *equitable sharing of benefits*. Article 15.5 requires prior informed consent, though of course, enforceable only in the countries, which have a law requiring such consent. Neither the concept of farmers' rights under FAO undertaking nor RIO treaty or GATT treaty provides specific mechanisms for achieving the goal of compensating local communities. FAO undertaking in fact is highly misleading. It celebrates the contribution of the farmers but provides for no direct incentives to those who conserve the genetic diversity.

My contention in this paper is that various schemes for compensation must take into account a variety of ethical positions guiding the motivations of those who conserve biodiversity. Same incentive or recognition or reward will obviously not work for all kinds of motivations. I also submit in this paper that given the past record of most governments having very weak commitments to make the machinery of government accountable to local disadvantaged communities, entrusting the task of routing compensation from national or international funds through the same in different machinery will be counter productive. Whether NGOs will serve the purpose depends to a great extent on their ethical position and accountability to local communities. This is one area where values of provider, receiver and the intermediaries would inevitably require reconciliation. Here again, the transaction costs² of fair agreements may be minimized more through faith and transparency than just through laws. Though legal framework is necessary to enable enforcement of respective rights in any exchange. It cannot be sufficient.

Part One: Coping Creatively with Stress: Generation of Institutional Diversity for Maintaining Biodiversity

Different kinds of Plant and Animal Biodiversity have been conserved through a variety of cultural, spiritual, and socio economic situations. Many of these institutions are concurrent while some are episodic, i.e., they emerge only in the periods of crisis. We have to understand how survival strategies of households alternate under stress and normal periods in high risk environments (signifying also many biodiversity rich regions), this will help us fully appreciate the role of consigning some strategies to institutional formats while leaving others as part of a

² If we spend more on at least one component of Ex Ante transaction costs i.e. negotiation and drawing up an agreement, then it is possible that total transaction costs as well as Ex Post transaction costs on monitoring, enforcement and redrawing agreements can come down substantially! Gupta and Prakash, 1993). The time and effort spent in searching and sharing information during negotiation with local communities will generate transparency and help create trust-the conditions which help minimize the transaction costs further. This process will also meet the requirement of Art. 15.5 of Prior Informed Consent of not just contracting parties i.e. governments but also communities providing biodiversity related information.

rich cultural repertoire. The ecological diversity coupled with institutional diversity shapes the portfolio choices of households. These portfolios include not just economic and social choices but also some elements of catharsis and playfulness or fun (Gupta, 1990a, Richards, 1987).

Some of the institutions are also embedded in a web of inter relationships of other institutions. For instance, certain plants growing in the compounds of temples may have been there not because biological conditions of the temple compounds were more favourable. But because certain rituals may either require those plants or the protection to these plants might be available more easily in that location compared to other places. Some times, religious norms may regulate the frequency and the extent of extraction. It is very difficult to disentangle the sacred from the secular in such cases. Perhaps, there may not be a need to separate the two. Chaitanya observes very poignantly, 'the fruit of knowledge is poison only when it is not transmuted by us into the pabulum of wisdom (1992:38). It is the wisdom-creating role of local communities that we may rather keep as a debt than trying to compensate. But some part of the debt has to be paid if the "crucible of culture, conservation and conscience" has not to dry altogether (Gupta, 1990).

Institutions enabling conservation of biodiversity could be classified on the basis of the key social or ecological functions that they serve. I am conscious of the possibility of many other ways of classifying these institutions.

We can devise appropriate compensating scheme only after placing the contribution of local communities and innovators in the relevant ecological, institutional, technological and cultural context.

Ecological and Household Portfolio Diversification, Vulnerability and Risk Adjustments:

The variability in social interactions will depend upon the extent of ecological variability's as evident from the portfolio characteristics of the households. The households could have four kinds of portfolios of economic activities. If we take average income on one dimension of the matrix and variance in the income on the other, the four possibilities can be represented as follows (Fig !):

Fig-1: Risk/ Variance and Return/ Mean Matrix

		Mean or Average Income	
		High	Low
Variance	High	HM-HV (entrepreneurial)	LM-HV (most vulnerable but creative)
	Low	HM-LV (Placid)	LM-LV (Subsistence)

Source: Gupta, 1981, 1988

We can see four kinds of portfolios viz. High Mean - High Variance (HM HV), High Mean - Low Variance (HM-LV), Low Mean - High Variance (LM-HV) and Low Mean – Low Variance (LM-LV).

HM-HV portfolios imply that households have such enterprises, which generate very high income but also have high fluctuations. If households prefer such enterprises, they should then be able to reduce the variance by controlling fluctuations or insuring against the same. The nature of networks such households would have among themselves and with other social groups as well as institutions (private as well as public) will be characteristically different from the networks of other groups as we will see below. These portfolios deal generally with specialised cash crops, hybrid crops or livestock with uniform genetic base. Their reliance on external inputs is excessive and their perception of nature is often segmented and extractive.

HM-LV portfolios would comprise enterprises that give high income with low fluctuation. Households with such portfolios would obviously have very high control over resources and institutions and also accumulate maximum surplus among all the groups. But placid portfolios can also lead to decadence as apparent in some very affluent societies. People become indifferent towards culture creating functions. Relation with nature becomes weak because people are not dependent on it for their survival.

LM-LV portfolios characterize households having low input-intensive enterprises such as local varieties of crops, local breeds of livestock with low but stable demand. These households are generally subsistence oriented and can break even with some difficulty. The culture and social ethos of such groups are bound to be governed by stable institutions, networks and cohesive leadership. There will be limited incentives for entrepreneurship and deviance. But these communities still have their links with nature intact.

LM-HV portfolios characterize the most vulnerable households. These households would have such varieties of crops, which are vulnerable to environmental and market fluctuations leading to generation of very low surplus. The livestock breeds though are well adapted to the environment; suffer huge loss due to drought or disease epidemics. The fluctuations in the non-farm sector also similarly impair the capability of household adjustment. In fact most of the households with such portfolios would have deficits in their budget. Their dependence on other social groups and informal institutions like moneylenders or traders is enormous. Their vulnerability often acquires highly exploitative forms dividing them into different sub-groups of mutually conflicting identities. Collective action, for economic purposes, among such people is extremely difficult. For cultural and social purposes, they have perhaps one of the strongest indigenous institutional infrastructures. Their tacit knowledge base is rich and often includes confluence of self-abnegating images. There are, however, exceptions, particularly among artisans and pastoralists. Such groups may have a stronger self-image and are also less vulnerable in regions where some demand for their products exists. The risks spread over space, sector and season or time also need to be appraised carefully to understand the evolution of institutional or individual solutions. Many of them are very creative and innovative. Their relation with nature is the strongest because they are most dependent on it.

Risk and Social Exchange Mechanisms:

In different ecological regions various kinds of constraints would become dominant and, therefore, there is a need for eco-specific mix of strategies and social structures. However, there are some patterns in the ways people come together and resolve conflicts in market-dominated versus nature-dominated regions. The former regions are the well-endowed, irrigated, low risk, high population density pockets. Since there is a larger surplus available with people, the market forces are stronger and often provide support which otherwise would have to be derived from social institutions. The nature-dominated regions include drought, flood, forest or hill areas where people have to rely on rain or other natural resources for their livelihood. Some of the key contrasts are mentioned in Fig:2

		Market Dominated	Nature Dominated
1	Communications system	Digital	Analogical
2	Pooling of resources	Very low	Very high
3	Reliance on common properties	Low	Very high
4	Settling of books of account	Very short term	Long term
5	The proportion of women headed or managed households	Very low	Very high
6	Women participation rates	Very low	Very high
7	Reciprocities	Specific	Generalized
8	Empowerment	Material resource-based	Knowledge resource and culture-based

Source: Gupta, 1992

The incentives different groups would need to conserve biodiversity would of course be quite different. Eco Institutional Model: 4-A (Access, Assurance, Ability and Attitudes):

Fig-3: Eco-Institutional Perspective

Ecological Resources			Institutions	Technology	Culture
/ I \					
Space where	Time when	Sector what			
Access	*****		***	**	*
	/ Vertical				
Assurances	*		*****	**	*
	\ Horizontal				
Ability	**		**	*****	**
Attitudes	***		*	**	*****

Source: Gupta 1987, 1989, 1991

All the four as i.e. access, assurance, abilities and attitudes, must be satisfied in a system level intervention for it to be sustainable. The advantage of the framework is if we know any two dimensions we can speculate about the third. And if we know three, we can speculate the fourth. Let us take the case of a technology for plant protection. It is useful for me to use biological pest control, if I have some assurance about others' behaviour. But if I did not, I might spend more on chemical pesticides, and increase the cost of plant protection of others as well. Further it is not enough to have access to technology and skills or ability to use it, if assurances are not available. Likewise, the culture of collective survival vis-à-vis individual survival would also influence the sustainability of technology as well as institutional arrangement. Culture is the glue, which holds the triangle of access, assurance and ability together. The empowerment of people cannot take place unless their access to resources, institutions, technology etc, assurances available to them from formal and informal institutions and skills to convert access into investments or outputs are synchronized in culturally adapted manner.

Any scheme to compensate local communities for conservation of biodiversity cannot be designed without showing sensitivity to these dimensions of the risk adjustment strategies.

Part Two: The cases of resource Conserving and regenerating Institutions and Technologies:

Resource Conserving Institutions are multi-functional in nature and generate restraint, reciprocity and respect, besides collective responsibility for conserving nature.

A: Shingle wood collection in Bhutan: There is a custom that people go to the forest together for collection of shingle wood in Bhutan on a particular day (Gupta and Ura, 1992). 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 other reasons. The fact that such sites are observed together 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.

B: Common property institutions for conserving breeding bull, Goat, or other resources etc.

Livestock was domesticated even earlier than many of the crops as the history of transition from pastoralism to settled agriculture shows. Some of the earliest seals found from excavations in Mohanjodaro civilization carry the imprints of the breeding bull. Even today large number of villages maintain a common breeding bull. In different villages different rules exist specifying the policy for feeding the bull, limiting the frequency of its services, tolerance of its intrusion in cultivated fields and tolerance of the damaged so caused. The fact however remains that most of the good cattle, sheep or goat breeds would not have survived if norms regarding boundaries and criteria for selection had not emerged. Animal biodiversity has been given much less attention than plant biodiversity. Although, the official strategies whether of intensive agriculture or cross breeding cattle or poultry are essentially aimed at reducing this diversity. Diversity in animals has also been maintained by having precise norms about which villages from where to bring he-calf to be reared as bull. Similarly, the diet of the breeding bull during the mating season in cattle has been specified in different cultures. There are occasional cases as in case of a Bhutanese province in which people are not allowed to bring exotic breed of cattle lest the quality of local germplasm gets affected.

Diversity in the village woodlots is maintained some times through rotational grazing. Examples exist of so adjusting the movement upwards and downwards of yak and cattle in a way that the two herds would not meet. Flowering of a herb Tseb is supposed to indicate the time for cattle herders to leave a month before yak herd would descend to that altitude. This ensure that some of the diseases do not get passed on from cattle to yaks and also the grazing lands regenerate before yak descends for grazing at that level. This example from Bhutan indicates both the role of bio-indicators in coordinating collective action and also the management of natural diversity through regulation of grazing by different species (Gupta and Ura, 1991).

C: Culinary Institutions

What to eat in which season after cooking in what manner has been specified in many communities. This could-have many functions apart from creating consciousness about the biodiversity. For instance, different recipes might generate niches for different tastes, search for various species and restraint in use of the more liked ones particularly when collected from wild.

There is a festival generally on January 13, on which day a particular dish called as 'satgadda' or 'undhiya' is made. Ladies would try to collect as many vegetables as possible and cook them together. Often, those who put the maximum number of vegetables would be quite proud of it and boast about it.

There is a particular day on which only such vegetables have to be cooked which do not require use of cutting instruments, like knife (Naik, 1994). It obviously means that some constraints of this kind would force the consumer to scout for such vegetables, which could be cooked without being cut with knife.

There are also festivals when tubers cannot be used or tubers only are used. It is quite possible that many of these festivals have gone on from the time when human societies were food gathering and hunting in nature.

D: Institutions for fasting

In almost all religions, there are specific periods prescribed for fasting. Some times, some of these fasts coincide with the change in seasons from winter to summer or summer to winter and thus help in coping with the stress that this change imposes. But what is more important are the detailed rules regarding what can be eaten, when and in what way. For instance, certain wild foods or uncultivated grains collected from the wild or field bunds or certain 'weeds', are specially authorized for the purpose. Apart from the nutritional contribution, these foods generate consciousness about the wild and its role in the cultivated systems of our existence.

The nature of the role wild plays our lives must be understood of respect for the wild has to be generated.

E: Aesthetic Institutions

Aesthetic values influence choice of species and their lay out in the home gardens and the hinterlands in many explicit and implicit ways. Some times, aesthetic preferences have functional difficulty and some times, these are merely cultural in nature. For instance, in coastal Karnataka, people plant basil in a raised pot, they go around it whenever they leave for an auspicious work. Basil has innumerable medicinal uses, but it also has its aesthetic and spiritual association. A contrasting example is that of bonsai plants that too of the trees of religious significance such as banyan tree. In some families, the elderly women do not like the idea of bringing trees in bonsai form, which are supposed to be outside. They would say, 'we are supposed to sit under these trees when they are-outside, how can you bring these trees inside under our shade or care' (Naik, 1984). It might appear odd that someone should object to keeping bonsai plants in one's house for such a reason. But imagine the fate of natural diversity if there were no taboos against ex situ diversity even for aesthetic purposes. It is possible that such instances may not be very generalizable. But the fact remains that such an institution has existed in most traditional communities.

Gauri Vrat: This is fast that is broken after feeding unmarried young girls who are required to grow at least seven kinds of grains in a earthen pot for two or three weeks. These seedlings are then offered into a nearby pond or river after some prayers. In one variant of the system two beans - one symbolizing old man after germination and another an old woman are included in addition to sesame, barley, green gram, cowpea (Patel, 1994). This is done before sowing of crops before onset of monsoon (may be to do germination test).

F: Religious institutions

In Rajasthan, even in the extreme arid conditions, if one would notice patches of green trees, there could be only two reasons. One, that there is a settlement of a community called as Bishnois in the neighbourhood. Or there exists an 'auran' nearby. Auran is a land left for God or goddesses in which even cattle are not allowed to stray. The dead tree can be used only for the funeral pyre purposes of those who cannot afford to buy wood (Gupta, 1985). Without any physical protection Aurans are an extremely important source of biodiversity. Bishnois are famous for protecting not just trees but also all kinds of animal species. In fact, the practice of chipko, i.e., hugging of trees to prevent them from being cut was started by a Bishnoi community village. Hundreds of people offered to give their life when the local King ordered cutting of the trees four hundred years ago.

Similarly, sacred groves exist in different part of the world. In spite of the functional uses of the biodiversity, these could not have survived only on the utilitarian ground.

Dharo Atham: In Shrawan (monsoon months), a grass viz: *Cynodon dactylon* which is relished by the cattle and is very nutritious is not cut either for fodder or for even worship on this day. Implication could be reverse of what we found in case of " Sama Pancham'. On this day at least the people are forced to look for other grasses (Patel, 1994).

Sama pancham: On this particular day, an uncultivated wild grain 'sama' viz: *Echinochola colonum* - a weed found in paddy- is only cooked and eaten. This weed would have been removed had this festival not been there (Patel, 1994).

The implication of illustrating these institutions is to underline the point made earlier about the variety of motivations which could lead an individual, family or a community to exchange, augment, pool or maintain biodiversity in different forms around oneself. Mere economic incentives, my contention is would not able to serve the purpose of conservation. Just as purely cultural reasons devoid of any economic advantage may also not work.

Part Three: Conservation through Experimentation, Innovation and Competition: Role of networks, NGOs and IPRs

The knowledge may be produced and reproduced through both cultural as well as social and in some cases individual innovations. Some of these innovations have been carried forward from one generation to another and thus become part of what is popularly called as traditional wisdom. But the spirit of experimentation may decline at certain point of time in history but it can never die completely. Because survival without innovation will be nearly impossible in difficult conditions. How do we discover these innovations, build upon them, generate experimentation and help the transition of experimentation into enterprise through support of markets as well as self-design institutions.

Unless excellence becomes a basis of entrepreneurship, a knowledge system is unlikely to grow and be refined with passage of time. In olden times, there were mechanisms for certifying excellence, either by excellent teachers or through peer reviews of the competitors.

Building Upon Local Knowledge Systems

Erosion of knowledge is a much more serious problem than the erosion of natural resources. We can probably reverse the declining productivity of natural resources like soil through watershed projects or other resource conservation strategies. However, erosion and regeneration of knowledge and resources cannot be easily reversed once lost. These have to be seen in a single-multiple generation framework.

**Fig-4: Scope for Regeneration
Generational Time Framework**

	Single	Multiple
Resources	<p>Eroded 1</p> <p>Conserved 3</p>	<p>2</p> <p>4</p>
Knowledge	<p>Eroded 5</p> <p>Conserved 7</p>	<p>6</p> <p>8</p>

Sustainability

Combination of cell of Regeneration

- a) Poor** 1 and 5. This is so because with in one generation (as in our times) both the resources and the associated knowledge base get eroded. The knowledge may only be available in old bookshops or waste paper markets, or pavement stores. The folk knowledge having been eroded may be almost impossible to reconstruct or rejuvenate. Erosion of knowledge was never so rapid as in our generation because of declining inter-generational communication. We have no time for our own elders or that of others.
- b) Very poor** 2 and 6. In this case the situation is even worse because the resources and the knowledge have been degraded for more than one generation. Only rare repositories of knowledge may exist among some bypassed communities.
- c) Medium** 1 and 7 if local knowledge is incorporated in strategies of regeneration. The knowledge will also be eroded if not used.
- d) Sustainable** 3 and 7. 4 and 8

- e) **Endangered** 3 and 5 can happen when state-controlled conservation of resources through park or sanctuary is attempted, keeping people out of the resource. If knowledge is eroded, the erosion of resource can't be far behind.
- f) **Not easily possible** 4 and 6. This is so because a resource cannot be sustained over generations without drawing upon local knowledge at all. Under condition of no human intervention or access, certain resources like forests may be conserved over generations without incorporating local knowledge. But with increasing influence of man-made (or woman-made) factors on the survivability of forests through acid rains, global warming or erosion of upper catchments etc., and increasing population pressure, would it be possible to pursue such a possibility at all. We doubt,
- g) **Possible** 2 and 8, if knowledge has been documented through efforts like Honey Bee and is available to people, regeneration of resources is possible within a long time frame.

Increased emphasis on providing short-term relief, employment and other means of subsistence in high-risk environments to alleviate poverty and stress erodes the self respect and dignity of disadvantaged communities. The will of people to struggle and innovate gets subdued. Both the resource and the knowledge around this resource get eroded. It is to overcome this bias in development strategies that we initiated the Honey Bee network five years ago.

This network aims at identifying the innovators (individuals or groups) who have tried to break out of existing technological and institutional constraints through their own imagination and effort. What is remarkable about these innovations is the fact that most of these require very low external inputs, are extremely eco-friendly and improve productivity at very low cost.

It is necessary to note here that organizations of creative people, which take the form of networks or informal cooperatives or just loose associations, would generate a very different kind of 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 only in the networks of local 'experts', innovators and experimenters. It is true that every farmer or artisan does experiment. But not every one is equally creative and not in the same resource-related fields. The transition of the developmental paradigm from a *victim's* perspective to that of the *victor's* is the answer.

Documentation of Local Innovations. Value addition and Networking: The Case of Honey Bee

In most cases of conservation of natural resources, sufficient attention is not paid to local value addition so that higher share of incremental income is generated in the local economy. Empowerment through value addition is a concept that may help in generating sustainable market supported solutions. This is all the more important because regions of high biodiversity are also the regions of high poverty. Several factors have contributed to this linkage. A global initiative started by us, SRISTI (Society for Research and Initiatives for

Sustainable Technologies and Institutions) takes note of the following factors to generate viable options

- (a) The regions where bio-diversity is high, (primarily due to diversity in soil, climate and other physical and social structures) are also the regions where poverty levels are very high;
- (b) The poverty is high because markets are often unable to generate demand for diverse colors, tastes, shapes and qualities of natural products. Products of mass consumption particularly when processed by machines have low variability because throughput by machines has to be of uniform quality.
- (c) The regions of high diversity also have very poor public infrastructure (just in tandem with weak private market forces) because the people have limited surplus to attract public servants, and they are less articulate and organized to create political pressure (except through insurgent movements as is becoming evident from different parts of the world).
- (d) The low demand for ecological and technological skills of these communities characterizes them as 'unskilled' labour pool fit for being a part of the urban slums, squatters or other similar work force. Once the knowledge system is devalued, the cultural and social decline follows. The tenuous relationship with the nature is ruptured. The ecological degradation spurred by various external resource extractors is aided and abetted by many poor as well as not so poor people for whom survival in short term seems possible only through eco-degrading strategies.

It is in this context that a global voluntary initiative was launched five years ago to network the people and the activists engaged in eco-restoration and reconstruction of knowledge about precious ecological, technological and institutional knowledge systems of people.

Global networking: Honey Bee

Much against the conventional understanding poor people were poor indeed, but not so poor that they could not even think. For them the experimentation and innovation was a matter of life and death given the uncertainties of nature expressed through droughts, floods and hail storms.

Honey Bee network newsletter is brought out in five languages in India (Hindi, Gujarati, Malayalam, Tamil, and Oriya) and Zonkha in Bhutan so that dialogue with the people takes place in their own language. The creative people of one place should be able to communicate with similar people elsewhere to trigger mutual imagination and fertilize respective recipes for sustainable natural resource management. The Honey Bee network is headquartered at SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions c/o Prof Anil K Gupta, IIM-A) — an autonomous NGO.

We realize that the technological innovations cannot survive without institutional innovations and support structures. Hence we have been documenting the ecological institutions which have been evolved by the people to manage knowledge and resources as common property

We insist in our work that two principles are followed without fail: one whatever we learn from people must be shared with them in their language, and two every innovation must be sourced to individuals/communities with name and address to protect the intellectual property rights of the people.

It is also possible to take the current global debate on biodiversity and peasant knowledge beyond rhetoric. Our network extends into 62 countries at present. Some of the colleagues have started similar documentation in their respective regions. Offers have been received from Nepal, Sri Lanka, Uganda, Paraguay and Mali for local language versions.

An experiment in People to people learning

We started the first issue of Honeybee with a note prepared by a scientist of Gujarat Agricultural University illustrating the lessons learnt by him and his colleagues from a careful study of farming innovations, traditional wisdom and localized experiments. This, we thought, would encourage the other scientists to make their tacit knowledge explicit. In any case nothing is gained by considering farmers as 'know alls' and scientists as 'ignoramuses'. Dialogue very seldom takes place amongst people with unequal respect for each other.

We also enclosed with the first issue a letter in Hindi from a developmental worker in Bihar cautioning us about the possible hazards of documenting local knowledge. His contention was that the poor had nothing else left with them. Do we want to drain them of this resource also? Will documentation and value addition not lead to a situation as in Assam where the people and workers who grow quality tea cannot afford to consume it. The best tea comes to London. Will the prospects of wider application of this technology reduce the local advantage and if not, how did we plan to avoid these dangers?

In the second issue we began with the discussion on the Gospel of Dirty Hand enunciated by Dr. K.M.Munshi in 1951-52 providing a framework for linking the soil, the toil of the field worker and the farmer with the soul of the learners and users of knowledge. Unfortunately he did not gain much ground in the bureaucracy or technocracy. We also referred to a Griffith Memorial lecture by Mazumdar in 1946 on the ancient Indian science of Botany in Calcutta. Two masters theses guided by Dr.Y.P.Singh, way back in 1965-67 on Indigenous Animal Husbandry provided perhaps the first acknowledgement of indigenous knowledge by formal scientists. Ashis Nandy planned a large research project on ethno agriculture so that the science and culture behind farmers' wisdom could be systematically catalogued. He could never get through the labyrinth of bureaucracy because the 'Green Revolution' was serving us well in the late seventies. Shri Dharampal in a book on Indian Science and Technology in the eighteenth century (1971) brought together several travelogues written by Britishers who visited India 150 to 200 years ago testifying to the brilliance of Indian scientific genius.

These references were intended to persuade the readers that they should not develop a false pride in being involved in something very new or something very unique. The interest in learning from the peoples' knowledge has been there in every culture and practically in every era. It is just that the elite fails to build upon these enquiries and therefore societies get trapped in a downward spiral of decay, degeneration and strife.

Honeybee also appeals to fellow researchers, activists and planners in other developing countries to identify native wisdom both to inspire and also to provoke the young minds to explore. In

every country a very strong oral tradition of knowledge generation, validation, scrutiny and diffusion exists. Honeybee strongly believes that boundaries between formal and informal knowledge systems may often be false. The informal system may have formal rules waiting to be discovered. The formal system may have informal beliefs, accidents, or conjectures providing impetus for further enquiry.

We have already collected more than fourteen hundred innovative practices predominantly from dry regions to prove that disadvantaged people may lack financial and economic resources, but are very rich in knowledge resource. That is the reason we consider the term 'resource poor farmer' as one of the most inappropriate and demeaning contributions from the West. If knowledge is a resource and if some people are rich in this knowledge, why should they be called resource poor? At the same time, we realize that the market may not be pricing peoples' knowledge properly today.

It should be remembered that out of 114 plant derived drugs, more than 70 per cent are used for the same purpose for which the native people discovered their use (Farnsworth, 1988).

What does it prove?

It proves that basic research linking cause and effect had been done successfully by the people in majority of the cases. Modern science and technology could supplement the efforts of the people, improve the efficiency of the extraction of the active ingredient or synthesize analog of the same, thereby improving effectiveness.

The scope for linking scientific search by the scientists and the farmers is enormous. We are beginning to realize that peoples' knowledge system need not always be considered informal just because the rules of the formal system fail to explain innovations in another system. The soil classification system developed by the people is far more complex and comprehensive than the USDA classification systems. Likewise, the hazards of pesticides residues and associated adverse effects on the human as well as entire ecological system are well known. In the second issue of Honeybee out of ninety four practices thirty four dealt with indigenous low external input ways of plant protection. Some of these practices could extend the frontiers of science. For instance, some farmers cut thirty to forty days old sorghum plants or calotropis plants and put these in the irrigation channel so as to control or minimize termite attack in light dry soils. Perhaps hydro cyanide present in sorghum and similar other toxic elements in calotropis contributed towards this effect. There are a large number of other plants of pesticidal importance found in arid and semi arid regions, hill areas and flood prone regions which can provide sustainable alternatives to highly toxic chemical pesticides. It is possible that private corporations may not have much interest in the development and diffusion of such alternatives, which pass control of knowledge into the hands of people. However, an informed, educated and experimenting client always spurs better market innovations as is evident from the experience of computer industry. Therefore, we do not see that there is a basic contradiction between the knowledge systems of people and the evolution of market rules to strengthen and build upon it. However, such a model of market would be highly decentralized, competitive, open and participative.

Honeybee in that sense is an effort to mould markets of ideas and innovations but in favour of sustainable development of high-risk environments. The key objectives of SRISTI thus are to

strengthen the capacity of grassroots level innovators and inventors engaged in conserving biodiversity to (a) protect their intellectual property rights, (b) experiment to add value to their knowledge (c) evolve entrepreneurial ability to generate returns from this knowledge and (d) enrich their cultural and institutional basis of dealing with nature.

Biodiversity Contests: Building Long Term Stakes of Children and Adults

No long term change in the field of sustainable natural resource management can be achieved if children do not develop values and world view which is in line with the sustainable life style. Children learn far better through competitive processes involving fun and pleasure. Accordingly, biodiversity contests have been organized for children of primary schools. In order to get the freedom that children need to have fun and joy inherent in such a competition, we organised similar contests among adults as well in different parts of the country.

On a given day, all these children - boys and girls -- are asked to bring all the plants which they know about along with a list of their names and uses. A similar contest is organized among the adults. Prizes are given for the best performance in different age groups. For instance, in one of the first such contests organized in Madurai with the help of Mr. P. Vivekanandan, SAVE, a student of age twelve got first prize by identifying 116 plants with their uses. The adult who came first could identify 240 species.

The remarkable thing in this contest was that a child of twelve years of age had completed half the intellectual journey compared to the maximum of the local community. Unfortunately, there is no future for this child if he wants to grow as an ecologist or herbalist. He would have to unlearn all this knowledge and learn a for apple, b for boy or c for cat, etc. Any discussion on sustainability becomes meaningless when we cannot generate viable institutional choices for those who already know and have concern for local innovations and knowledge systems.

In a separate contest in Uttar Pradesh, a son of a brick-kiln owner came first with 98 species and two girls came second. The shepherd's son in the first case or brick layer's son in the second case pose a greater challenge to us for devising viable alternatives for sustainable development. It is well known that enrollment rates are very low and drop out rates are very high in the schools in disadvantaged regions. The irony is that eco-knowledge rich, but economically poor children from these backward regions have to become unskilled labourers and occupy the lowest income occupational niches in urban areas. Progressively, the disadvantaged regions are drained off not just the ecological resources, intellectual knowledge but also human resources in the form of young able-bodied people.

Part Four: Compensating creativity of the fanners, tribals and pastoralists: towards an effective sue generis and IPR system

There is a considerable apprehension in the minds of many third world scholars, statesmen and fanner leaders that the recently concluded GATT agreement would prove disastrous for third world economies. The uprising of indigenous farmer communities in Mexico after the signing of NAFTA is cited as an evidence of things to come. For many political parties and industrial associations, the post GATT scenario implies return of East India Company, i.e., colonization

by the West. One could narrate many more examples of the fears and anxieties that media constantly projects in the third world. And yet, I intend to paint a picture totally contrary to these visions.

My faith in future possibilities arises not out of anything extraordinary we may have done in past. This faith also does not emerge from any false hope that I may be accused of having from the multinational corporations or multi lateral bodies, which would govern future global policies. I am aware that the interest of the poor farmers, artisans and labourers would not be at the core of concern of these interest groups. But what pains me most is that concern for poor is not at the core of opposition to GATT either.

I submit that those who are opposing the protection of intellectual property rights are doing so perhaps because they have no confidence left whatsoever in the native genius. Their argument seems to be very simple, "since we have never won in past in any global struggle, what is the guarantee that we will in future when odds are against us". A mentality of failure, cynicism and defeatism is unlikely to generate any hope even with best of the circumstances and all odds favouring us. I also submit that many opponents of intellectual property rights do not realize that they are aligned with those forces in agriculture or industry which made most of the protected economic regime without shedding any tear for the poor tanners or farm workers or even the industrial worker. The increase in prices in the last several years despite good rains has been without GATT. The lack of employment opportunities, high illiteracy in some of the most disadvantaged regions and low productivity have been the nature of things without GATT.

My argument in this paper stems from a faith that I have in the empirically demonstrated creativity and innovation at grassroots level.

It is the first time that the communities and individuals who conserved biodiversity despite remaining poor have a chance of overcoming their poverty by being compensated for their traditional as well as contemporary creativity. Even more promising possibility is that this can happen without any need for patronizing protection from the state (which kept them poor and illiterate for so long). That is not the only promise. We could even hope that the polity of this country for once could get out of the hands of self seeking rent extracting class of non-competitive, non-creative and non-inventive industrial, trading, professional and farming elite. The game thus is very clear. Those who have faith in the inventive capabilities of the economically poor but intellectually rich communities and individuals would like to exploit the opportunity offered by GATT and Rio agreement. On the other hand, there are those who still live under the illusion that a patronizing and protective regime is what poor are looking forward to.

Let me also add that it is not that I see a possibility in GATT for the same reason as many in the government. In fact it was most tragic, that during the recent discussion in the Indian parliament on the subject, most members of the opposition opposed GATT because that they thought India had no chance of winning in the global race for excellence. But those in the ruling party also did not support it because they had any more faith in the native genius. They felt they had no choice but to accept this treaty. Thus we witnessed a strange spectacle. Those who represent the people in this country were almost unanimous about the absence of any role that the disadvantaged communities had to play in the future restructuring.

It is this role that I have talked about in this paper. First I discuss the key articles of the Biodiversity treaty, FAO undertaking on the Plant Genetic Resources and TRIPS part of the GATT. I describe the framework for compensation next, lastly I suggest some measures that India and other developing countries need to take to derive the promised and potential benefits from the new IPR regimes. I contend that if the new IPR regime does not offer the benefits that I foresee, it will not just be so because my expectations are wrong but because like many other opportunities, we will miss this one too. After all we have worked so hard so long to fail in so many things.

Harmonizing GATT, RIO and FAO: why poor are 'rich'?

What does GATT actually say about patenting. Much has been written about this subject by colleagues without perhaps a careful reading of the conventions of TRIPS.

A. Section 5 Article 27 of TRIPS deals with Patentable Subject Matter. It reads:

1. Subject to the provisions of paragraphs 2 and 3 below, patents shall be available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application.
2. Subject to paragraph 4 of Article 65 and paragraph 3 of this Article, patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology and whether products are imported or locally produced.

[Article 65 provides for transition periods for developing countries and former communist countries.]

3. PARTIES may exclude from patentability inventions, the prevention within their territory of the commercial exploitation of which is necessary to protect order public or morality, including to protect human, animal or plant life or health or to avoid serious prejudice to the environment, provided that such exclusion is not made merely because the exploitation is prohibited by domestic law.
4. PARTIES may also exclude from patentability:
 - (a) Diagnostic, therapeutic and surgical methods for the treatment of humans or animals;
 - (b) Plants and animals other than microorganisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, PARTIES shall provide for the protection of plant varieties either by patents or by an effective sui generis system or by any combination thereof. This provision shall be reviewed four years after entry into force of this Agreement.

It is obvious that plant and animals other than microorganisms cannot be patented. The varieties of plants and animals have to be protected by sui generis system or patents or a combination of both. It is important to note that microorganisms can be patented provided they have been significantly modified. A bone of contention here is whether plant genes

incorporated with in microbes can be patented if they express their characteristics in microbes. My understanding on the subject is that such a patent may be permissible. To what extent such a thing will become contentious, only will tell but it is certain that applications of this type are going to arise almost soon after we open our gates for the purpose. Application for a transgenic plant variety has already been filed in Indian patent office several years ago. To what extent one can splice plant genes, incorporate the same in micro-organisms and seek protection of these genes as modified micro-organisms and not as plant genes is a question which is yet to be sorted out.

The major issue is that patents are available for, "for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application". Indigenous knowledge which is not known to a biotechnology or drug company or a company interested in producing herbal pesticides or veterinary drug is patentable. The same plant cannot be used by some one else for the same purpose for commercial purpose. Congressional Research Service of US Congress went into this question recently. Axt, Com, Lee and Ackerman, 1993 examine,"

intellectual property rights in pharmaceuticals in a particular context, namely, medicinal products and processes derives from the biodiversity resources of areas inhabited by indigenous peoples. The subject has become of interest for a variety of reasons. First, there is an increasing awareness that plant and animal species in the tropical rainforests and elsewhere are disappearing at an accelerating rate due to human activities that destroy or effect their habitat. Second, there has been a resurgence of interest among pharmaceutical companies and government research agencies in screening plant and animal species for medicinal properties useful in treating various diseases (biodiversity screening). Third, there is increasing awareness that the destruction of habitat has proven fatal not only to the numerous plant and animal species but also to many indigenous peoples dependent upon that habitat, and continues to threaten many that still exist.

The Report includes evidence about the use modern industry has derived from the use of indigenous knowledge. It recalls the famous study by Farnsworth (1988, also see, Gupta, 1989, 1991, 1992, 1993, Shelton, 1993) about the fact that out of 114 plant derived drugs, more than 74 per cent are used for the same purpose for which native people discovered their use. Botanists are reported to be

searching for almost extinct varieties of wheat in the Ukraine and Turkey in an effort to procure genes that are resistant to a new type of aphid which kills wheat. Ultimately, they want to produce crop varieties which will be able to withstand the pest. Today, three plant species — corn, wheat, and rice - -supply about 60% of the world's total food needs.

What does Rio treaty say on this subject:

Art 15.2: Each Contracting Party shall endeavor to create conditions to facilitate access to genetic resources for environmentally sound uses by other Contracting Parties and not to impose restrictions that run counter to the objectives of this Convention.

Art 15.3: For the purpose of this Convention, the genetic resources being provided by a Contracting Party, as referred to in this Article and Articles 16 and 19, are only those that are provided by Contracting Parties that are countries of origin of such resources or by the Parties that have acquired the genetic resources in accordance with this Convention

Art 16.3: Each Contracting Party shall take legislative, administrative or policy measures, as appropriate, with the aim that Contracting Parties, in particular those that are developing countries, which provide genetic resources are provided access to and transfer of technology which makes use of those resources, on mutually agreed terms, including technology protected by patents and other Intellectual property rights, where necessary through the provisions of Articles 20 and 21 and in accordance with International law and consistent with paragraphs 4 and 5 below.

Art 8j: Subject to its national legislation, respect, preserve and maintain knowledge, Innovations and practices of Indigenous and local communities embodying traditional Lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and Involvement of the holders of Such knowledge, Innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, Innovations and Practices;

On one hand the treaty provides for freer exchange of germplasm and on the other hand it requires mechanisms to be developed for compensating local creativity.

So much so that in Art 15.5, Treaty requires Prior Informed Consent (PIC) to be obtained of the contracting parties for obtaining access to genetic material or associated knowledge. It is obvious that such a provision will apply only in the countries in which the legislation requiring PIC has been enacted.

The Farmers' Rights under FAO undertaking on Plant Genetic resources do not go as far. The concept of international gene fund under this promoted by the scientists like Dr Swaminathan through FAO as well as Keystone Dialogue delivers nothing to farmers. It is really shame that a fund is supposed to recreate in the name of farmers from which only governments and their bureaucracies will gain. I and my colleagues in SRISTI of course do not agree with this concept at all. To us any arrangement which does not ensure improved access of the Biodiversity conserving communities to additional revenues to be used at their terms through their institutions is not acceptable.

Steps to be taken for creating environment for compensation:

1. *Data Base Development*

Any system to grant protection to breeders, farmers, tribal communities and other associations of people, companies (national or international) can not work without an adequate data base which provides information not only of national origin but also international origin about newness, non-obviousness and distinctiveness in case of plant varieties or inventiveness and utility in case of products.

1.1 *Novelty Search and Data Base Development:*

For any registration system to work (we are assuming that patenting of plant and animal varieties is not being considered at this stage) extensive novelty search will be inevitable. The Patent Cooperation Treaty has one such arrangement in which an International search should be completed within 90 days (rule 42). The International Patent Documentation Centre at Vienna provides this service at a nominal cost. India will need to develop this facility as efficiently as possible.

1.2 *Data base On Local varieties. Land races. Wild plants and plant products used for sustainable performance of agriculture*

Almost all agricultural universities, botany departments of general universities, ICAR institutes dealing with germplasm and other related institutions lack access to any computerized data base of what they possess. Personal inquiries have revealed that in most crops, the decline in the collection of germplasm in the last few years has been very rapid. The need for urgent computerization of this information can not be overemphasized. It is nearly impossible to achieve that goal within the given administrative constraints and staff problems apart from infrastructural limitations. And yet any database so developed will have to be maintained by the same institutions.

Hence we need the following kind of strategic alliance of institutions having competence in this regard: NGO/s which have competence in plant genetics and breeding, Management of information and computerization and which have already developed data bases could be entrusted with this responsibility under the guidance of a steering committee of competent scientists of ICAR, SAUS, IIMs, IISc and even private sector. The database can be developed within next six months if there is a determination to achieve this gigantic task.

The next problem will be evolution of a scheme under which SAUs and ICAR institutions would be enabled to maintain existing germplasm banks in situ as well as ex situ. The process for ex situ conservation will be described here in later. It may be noted that NBPGR even today has only a fraction of what individual breeders have in their collections particularly for crops that are less important today (like minor millets). The financial resource constraints prevent most breeders to rejuvenate their germplasm every year. Recent techniques available for reviving old seeds will have to be employed to sustain fast depleting resources.

2. *What should be catalogued?*

We should not restrict the protection only to land races, varieties, hybrids or semi wild plants. **Wild plants** but with specific functions in domesticated agriculture in the form of green manuring, mulch, herbal pesticides, veterinary medicines, stress fodder or feed, nutrient supplement for livestock, anti-oxidants compounds, etc., should also be provided protection and thus documented in the data base.

3. *What can thus be protected*

Plant Breeders' Rights shall be granted for any plant variety, which is clearly distinguishable by one or more functional characteristics, which is stable and homogeneous.

The origin of the new variety may be artificial or natural- the latter term to include the materials identified in a natural or cultivated state.

The certificates may of course be transferred like a personal property.

Here we have to ensure that the term breeders' right is defined very broadly. Selections from nature of plants that have specific function in any agro-eco system and have thus been attributed distinctive role will be protectable.

4. Who can do it

Plant breeders, farmers, tribal or non tribal communities, village panchayats, NGOs representing individual inventors of specific non-obvious and new features/ utilities of plants and public institutions in possession of material derived from nature or farmers.

In cases where the original providers are known and can be traced in terms of villages or households, and in cases in which the plants are grown in restricted areas (i.e. few hundred hectares or a few villages), the communities represented by panchayats, local conservation committees, cultural caste panchayats or traditional tribal councils etc., can also register land races and become eligible for royalties that may become available through value addition. In the case of sacred groves, temple forests or village forests, the communities which maintain those groves would be eligible for such registration.

For plants grown on public lands but for which knowledge exists among local communities or herbalist individuals or specific farmers, the plant variety act should register the unique knowledge in the name of such individuals.

In areas where many people know a specific use of a specific plant wild or cultivated and thus providing it a distinctive characterization, the rights should be treated as trust rights belonging to a region: which plants grow.

In cases in which the plants grow very widely for instance *Calotropis gigantea* (akra) but some uses are restricted to a locality (though other uses may be widely known), protection for that use should be given to the concerned individuals, groups there of or the regional Biodiversity conservation trust funds to be constituted for the purpose or a combination there of.

For plants which are widespread and their uses are also widely known, the rights should belong to state Biodiversity Conservation Trust fund to be set up at national level. This fund will receive any royalty that may accrue from commercialization of such knowledge. It is to be noted that just like an information which is known to the members of a large firm but not to the society at large is considered eligible for registration under variety act, similarly knowledge which is known to a community but not to the rest of the world should be eligible for the purpose. In Queensland, Australia, an act was passed by the local legislature on April 16, 1993 declaring local genetic wealth a state property making it obligatory for any international organization to seek legal rights before using local diversity. It happened when a Japanese company drew upon local diversity and developed commercializable product.

Thus the protection under the act should accrue to communities, groups there of, local individuals, or association there of represented by NGOs like SRISTI etc.

The Seeds Act will need to be modified to include plants used for other agricultural purposes as well.

5. Changes in NBPGR:

- a) The passport information sheets of the NBPGR do not include in all cases the name and addresses of the providers or the community conserving local land races. Since many times the germplasm is collected from local markets, the longitude and latitude is given for the region without identifying the communities conserving the land races. It should be obligatory for NBPGR to include such information.
- b) The future collections should also record the measures used by the local community for conserving the specific land race so that if it was under danger of erosion due to economic or other reasons, mechanisms could be developed for urgent incentives for conservation.
- c) The NBPGR collections should be monitored in terms of quality, accession, processes of exchange etc, by an independent watch dog committee so that long term interests of the country can be well safe guarded. It is not to suggest that scientists concerned would not be safeguarding national interest on their own. Rather such a committee would ensure that NBPGR gets the support it deserves and provides services that society expects. In that sense the committee would empower NBPGR's status in society.
- d) NBPGR should ensure that after drought or other such natural contingencies, if the seeds of local land races collected from a given region are lost, the same are restored to the community on a small scale so that natural diversity and in situ conservation continues unhindered. This process will require close coordination by state departments of agriculture which will liaise with NBPGR.
- e) The development of national Information system on germplasm and local diversity linked through electronic mail is an urgent necessity which can be done through expertise available within the country. No international consultants need be involved for the purpose. This is all the more necessary given the strategic nature of such information.
- f) CGIAR centres resolved in April 1992 that they would treat germplasm provided to them as material held in trust for the world community. Whenever, they provided such material to organizations other than "appropriate government authorities in developing countries, they would do so under *material transfer agreements* and any national authority which received the material would be asked to follow similar procedures in passing it on to other organizations". These agreements would serve following purposes:
 - i) Any useful genes discovered in the material could not be withheld from the country from which material originated nor could the centres be prevented from using such material or specific genes derived from it, for the benefit of developing countries.

- ii) Accordingly, these agreements would require the users to negotiate with the Centres if the original material, essentially derived varieties (as per UPOV 1991), or genes isolated from the material were to be protected and used commercially.

The CGIAR guidelines further noted that " in the case of Industrial country, the Centres could conceivably allow public or private institutions to gain from the rights to improved germplasm under plant variety protection, provided the rights were gained through such a transparent fair procedure, and did not restrict further future use of the material by the Centre". In such cases any financial returns from such agreements would be passed on the international fund.

- g) In the light of point 6, NBPGR needs to develop *Material Transfer Agreements* so that any private or public agency- national or international, other than the government and its organs- signs an agreement about the terms of exchange, right of original providers in any profits and revenue accruing from commercialization of genes from the material provided. It is natural that NBPGR would not be able to monitor how different users actually used the material.

For this I suggest another mechanism which has not been talked about in legal literature much so far. This should imply a need for any one depositing a variety or germplasm with NBPGR, or registering the same with the PBR authority to be set up under this act to disclose the source of the material and its parents. It should be stated that the material has been taken after fulfilling Material Transfer Agreements. It is possible that the parent lines may have been derived from sources which may be in public domain and unlawful possession of these lines (say by breeders who take the material with them while quitting their job with public sector for greener pastures) may be sought to be legitimized by registration under the Act.

- h) Further, the NBPGR should also develop clear norms and guidelines suitable for post PBR regime for sharing the genetic material with CG system, private sector and other countries.

6. Registration system

The registration system for plant varieties, and germplasm used for breeding or extracting plant products would not require growing the sample and confirming its validity. Where as in the alternative system akin to patent regime, the growing out would be necessary. As studies have shown, the first one is more expeditious but may end up providing protection to varieties and lines which may not have the property claimed. There might be some litigation as a consequence of the same. On the other hand growing out process would take much more time cost and manpower though would generate greater assurance in the mind of registering authority and hence potential consumers of this right.

7. DUS: Distinctiveness. Uniformity and Stability

An issue which needs attention here is that we need to permit protection to diverse and heterozygous lines too so that genetic uniformity is not encouraged and reinforced through PBRs.

Secondly, we need to consider whether distinction needs to be established in terms of important characteristics or just functionally distinct one. I favour the second.

Should written description be considered sufficient or grow out be considered necessary. May be in the beginning grow may be necessary for varieties used for breeding but the ones used for deriving products for agriculture, description may be considered sufficient

The practices documented by Honey bee and SR1ST1 network should be considered eligible for registration in the joint name of SR1ST1 and the concerned farmers where we can convince ourselves about the genuinity of innovation. The registration system should not discriminate on the basis of obviousness to a small group of farmers in a village or a taluka. The point to be notes is that the practice could not have been discovered or invented by a lay person with average knowledge in the field.

8. Essentially Derived Variety (EDV)

The variety similar to an existing variety except one or two characters could generally be called as EDV. This provision has been misused for what some people call cosmetic breeding and hence needs caution. It may be desirable to distinguish the economically distinct from functionally distinct. For instance, variety may have little early flowering than an existing variety of similar kind but no economic significance of the same has been found as yet. It should be registered. The advantage may far outweigh than loss. The advantage is that information about such lines become known and thus breeders not just in India but also abroad may take this into account and may like to license the use. Further the breeder is encouraged to think ahead and not just address the problems of immediate future. The disadvantage is that the registration authority will receive a large number of applications and thus its workload may increase. The burden of proof lies with the institution, which challenges the new registration. This again can be misused by lot of private small seed companies, which without much research may submit applications of selections from publicly developed varieties. This problem to my mind can be addressed by the issue of insistence on disclosure of source of the lines. Unlawfully acquired lines will not be registered.

9. Farmers' Rights

A. It should be clearly understood that FAO provisions do not serve our purpose at all³. we suggest that we recognize four fold scheme of compensation:

- a. Material- Specific
- b. Material -Non Specific
- c. Non Material- Specific
- d. Non Material- Non specific

a). Material- Specific: In cases in which specific individuals have contributed to conservation of land races or wild plants with specific economic and inventive uses, their rights to receive licensing fee or royalty must he recognised.

³ In the name of farmers who conserve the biodiversity, the proposal of international fund with no direct devolution of economic incentives to farmers is not legitimate at all. Such a fund will only be used for financing fat salaries of international bureaucrats.

In case of (b) i.e. material -non specific i.e. community or a larger group, the compensation would flow to a group through trust funds.

There are several ways in which revenue can be generated;

(i) A cess on the sale of seeds using the given germplasm conserved or contributed by the specific individual or community,

(ii) Share in the turnover from commercializable plant derived product such as herbal pesticides, veterinary medicines, vegetative dyes, anti-oxidant compounds, nutritional supplements etc.

(iii) A tax on the grain markets for conserving diversity

(iv) License fee for using germplasm still conserved by communities in backward regions

(v) The license fee could be supplemented by larger investments in infrastructural development in these regions particularly in education and other minimum needs.

There are several other ways in which the revenue can be generated. The important point to be understood is that people would not conserve biodiversity while remaining poor for too long.

It has also to be remembered that while farm leaders are opposing the IPR regime for farmers' and the scientists, they have no locus standee on the matter. The biodiversity is least in green revolution regions from which they come. The regions, in which it is highest, would not get another chance for being compensated for their ongoing contribution to maintenance of diversity and associated knowledge system.

One can innovate in many ways to identify the precise areas and communities that are conserving rare germplasm. The primary school children and teachers can be involved in country wide documentation of the biodiverse regions, races, wild plants of economic importance etc., in the form of a campaign led by some committed NGOS and professionals apart from community leaders. State department of agriculture and revenue staff can also be involved in urgent inventorisation of knowledge, materials and claimant communities and individuals.

Farmers growing local varieties particularly under threat will need to be compensated for not shifting to high yielding varieties in selected areas. Mechanisms can be worked out for *in situ* conservation through the involvement of state agricultural universities and other conservation bodies.

c). The non material-specific rewards deal with honour and recognition of individuals and specific groups of people who have contributed most in conserving biodiversity.

d). The non material and non specific instruments deal with changes in policies, curriculum at different levels, institutional norms for providing credit and other support systems. Banks would not consider financing a herd of local well-bred Gir cows, or biodiverse farm at the same scale at which they would finance input intensive farm. Students are not taught any thing inspiring about the contribution of communities, which conserve biodiversity. On the other hand they are shown as backward.

B. A scheme needs to be developed for supporting all those panchayats, which will undertake systematic cultivation of local land races in every season in large enough areas for enabling some seed exchange. Villages which have conserved local varieties like Jackrana of Bajra or Khirchia of salt tolerant wheat need to be provided some funds for local development linked to the contribution these land races are making in breeding on an ongoing basis. This will give a signal to other communities as well. Funds under this scheme also may be allocated by an autonomous body rather than bureaucracy.

C: The Patent act must provide for recognition of indigenous innovations. Data base like that of SRISTI can provide a valuable beginning point. Scope can exist for defensive patents in which certain innovations valid for larger social use can be patented not to prevent their diffusion but to prevent their being patented by some third party.

D: Three changes are necessary as a consequence of Biodiversity Treaty:

The prior Informed consent of the community and any other institution any one providing biodiversity must become compulsory by law.

The involvement and approval of conserving communities and individuals must become obligatory. The economic incentives for people must be put in place for compensating innovators.

Summing up:

We have to enact laws that will enable compliance of above provisions of GATT and Rio treaty. It is true that lobby of farmers from green revolution regions will oppose these provisions because of several reasons. The poor peasants from high biodiversity regions unfortunately do not have the clout that can help counteract this pressure

We see the new IPR regime as an opportunity for getting the creative and innovative people their due. We have argued earlier in the paper that IPR regime by itself will not be able to provide all the incentives that are needed for encouraging different kind of biodiversity to be conserved by communities and individuals with varying motivations.

We hope that the ideas here will make some people realize that we cannot hold the noble ethics of biodiversity conserving communities responsible for their poverty for too long.

We might otherwise kill the golden goose, which laid the golden eggs for so long.

Compensating Local Communities for Conserving Biodiversity: Shall We Save the Goose that Laid the Golden Eggs So Long, IIMA Working Paper No.1206, August 1994