

Will Patents Preserve the Experimental and Innovative Spirit and the Conservation Ethic at the Grassroots?¹

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Conservation of environment including biodiversity and associated knowledge systems requires cultural, institutional, and technological innovations besides a deep seated ethical value set. It is obvious that conservation ethic cannot be reinforced, rejuvenated, and sustained only through material incentives, and that too aimed at only individuals. The communities create and maintain the space for articulating and resolving contested perceptions about what to conserve, for how long, at what cost, and for whom. It is natural that increasing pressure on resources not just from the local communities but also from outside stakeholders, cannot be counteracted only by cultural and spiritual values. The material needs for survival create their own pressure which needs to be resolved through a portfolio of incentives for conservation as well as for propagation of environment-friendly technologies and institutional arrangements.

To understand the role of various incentives including the ones offered by the Intellectual Property Right regimes, we need to understand the relationship between the technology, institutions, and culture. The technology is like words. Institutions like grammar, and culture is like language.

The incentives for technological change and innovations have to be reinforced by rules for restrained consumption, communitarian spirit and concern for future generation. And these have to be situated in a given cultural and historical context. Let me illustrate. A fishing community uses a gill net to catch the fish. It can use a mesh size of two inches which would trap smaller fishes and also bigger fishes and affect the sustainability adversely. It can also use four inch mesh size so that only bigger fishes could be caught and the sustainability would be enhanced. The incentive for using four inch gill net and disincentive for using two inch gill net would largely emerge from the collective rules evolved by the community. The values, which generate concern for future, may emerge from cultural basis of consciousness. A technological innovation involving use of a particular biological material for retting the net can extend the life of the nets by reducing the damage by corrosion in salty water of sea. There could be many other innovations, which could improve efficiency. But focus only on efficiency can sometimes be counterproductive. For instance, some communities use dynamite to catch the fish. Obviously, dynamite would kill the small as well as big fish and is surely a non-sustainable technological innovation. It is beyond dispute that innovations are necessary for improving technical efficiency of any task, reducing costs, drudgery and improving the return on investment. But in the absence of sustainable institutions and compassionate culture, technological change by itself cannot generate positive environmental outcomes.

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There are situations where absence of institutional conditions can, to some extent, be compensated by technological innovations. For instance, sustainable pest management would require farmers to use a variety of means including crop protections, mixed farming, looking after soil health, using bio-control agents, collective decision about sowing dates, varietal choice etc. However, if collective action is not possible, availability of non-chemical pest control agents such as herbal pesticides or growing trap crops can help individuals to reduce pest incidents though the cost could be higher, than would be the case, if every body cooperated. The interaction between technology and institutions is a complex one(Gupta et al, 1997, Sinha, 2001). And this complexity increases further when we deal with the variety of conditions in which conservation takes place and local knowledge systems evolve, interact and are used for solving problems.

In this paper, I deal with the complexity of knowledge systems that evolve in a socio-cultural and institutional context. The interface among private, community and public domain knowledge is analyzed to assess the ways in which we can isolate the contributions of different actors in conservation as well as evolution of knowledge, innovation and practices. The intersection of social, ethical, natural and intellectual capital is discussed next to highlight the overlap of intellectual property (a small subset of intellectual capital) with natural, ethical and social capital.

I discuss the evolution of Honey Bee Network which provides a time tested way of learning from people and adding value to their creative and innovative potential. I then focus on the specific instrument of Intellectual Property Rights system (henceforth, IP system or IP regime) to suggest a way in which costs of conservation can be supported by a stronger, accessible, and accountable IP regime. I highlight the need for changes in IP system to reduce transaction costs of small healers, herbalists, and other innovators as well as their communities in dealing with the IP system. I must repeat the central contention of this paper that IP instrument are only one of the many incentives dealing with material and individual rewards. These by themselves may be necessary but are certainly not sufficient for generating positive outcomes for environment. SRISTI, a voluntary organization, supporting Honey Bee Network, has, therefore, articulated the need for six Es of which only one deals with *efficiency* where role of technology and IP instruments in providing incentive for innovation can be underlined. The other Es are, *Equity, Excellence, Environment, Ethics, and Education*. All the six Es have to be converged and synergised. IP instruments play thus a limited role but potentially an important one.

Part One

Knowledge Domains: interface among Individual, Communal and public domains

There are many aspects of environment ranging from local ecological conditions to global commons such as ozone layer and climate change conditions, which need attention. In this paper, I am restricting the discussion to those technological and institutional conditions,

which are far more relevant at local level though their impacts in some cases can be global. For instance, if some endemic and endangered species having potential for solving some major global health problem do not get conserved for want of incentives, then a local conservation problem has global impact. One of the major objections to provision of incentives for conservation is that higher the valorization, greater may be the possibility of over-exploitation. In some cases, this may as well be true. However, there are equally strong cases where prospects of long term future income may not only provide incentive for conservation but also for augmentation of the biodiversity resource. It is not just the incentive but also the institutional context in which an incentive is provided that makes the difference in terms of environmental impact.

The asymmetry in access to biodiversity and opportunities for value addition and benefit sharing among formal and informal sectors is evident all over the world. However, of late, it is also becoming clear that communities and individuals, which have contributed towards the conservation of biodiversity and associated knowledge systems are not willing to keep patience with the current asymmetry. The Convention on Biological Diversity, FAO undertaking on genetic resources and farmers' rights and recent discussion in the inter governmental panel set up by WIPO on genetic resources, indigenous knowledge and intellectual property rights provide sufficient indication of the tensions that exist on this continued asymmetry.

It is now becoming obvious to most developing countries that unless national initiatives are taken to correct the distortions in the incentive structures for local communities, the erosion of knowledge and the resources will not be stemmed. The erosion of knowledge takes place due to many reasons. One of the important reasons is the unwillingness of young people to acquire the traditional knowledge and improvise it by blending it with contemporary knowledge because the incentives are not adequate at present. While the older generation had lesser choices and also a stronger communitarian spirit, the younger generation seems to prefer a more remunerative choice, which can compete with other available alternatives. In any case, they do not want to remain poor, which they notice was the fate of the most of the knowledge rich traditional knowledge experts.

One of the challenges before policy makers is to identify a portfolio of incentives, which provide monetary and non-monetary incentives to individuals, and groups engaged in conserving diversity and associated knowledge systems.

Some of the basic building blocks of the emerging policy consensus are:

- a. The process of development cannot be dignified unless it builds upon a resource in which poor people are rich, i.e., their knowledge.
- b. The conservation of knowledge in a globalising economy cannot take place entirely on cultural grounds. Institutional support systems are necessary to document, characterize, valorize and incentivise these knowledge systems.

- c. While the role of communities in conserving the resources and the associated knowledge system is very vital, without proper incentives for individual experts and innovators, the incentive for specialization and adaptation of knowledge to changing needs may not exist.
- d. The educational system has to make a significant contribution in this regard so that the esteem for this knowledge system begins to take shape right from the early stage.
- e. The intellectual property rights of the individuals and communities have to be protected if benefits have to be generated for the knowledge experts as well as local communities. If knowledge is in public domain, then there is no need for any one to pay any compensation or provide reward to providers of such knowledge and/or resources.

Knowledge systems evolve through an interaction between private, public, and communities space or domains. Incentives for production of knowledge for private use, collective use, or public domain use with or without proprietary rights will have to be differently analyzed. In Figure One, various conditions are described under which these interactions take place.

Contested Domains of Local Knowledge: private, community and public (Gupta and Sinha, 2001)

The knowledge could be produced (see figure 1) by individuals, and or groups alone or in combination. Some of this knowledge may diffuse only locally to be characterised as community knowledge while other may diffuse widely among various communities in a region and some time across regions and countries to become public domain knowledge. Within the community knowledge, there may be elements, which are restricted in scope or in terms of accessibility while others may be in public domain. Similarly, individuals may also produce knowledge, which they may share widely with the community and outsiders in a manner that the knowledge might become public domain. However, some of the knowledge produced by the individuals may be kept confidential and accordingly may be accessed only with restrictions. Individual knowledge experts build their expertise by experimenting and innovating with the traditional knowledge base with or without blending it with external inputs. To that extent, the individual biodiversity based innovators do owe their communities some credit for the opportunity to make individual innovations.

Table – 1 Contested domain of Knowledge

a) Private individual knowledge inherited from forefathers	K1
b) Acquired the skill to practice it faithfully without modification or with modification	K1-wm K1-m
c) Individual rights to use the modified and unmodified knowledge according to same rules Or different rules	K1-sr K1-dr
d) Knowledge known to the community	K-2
e) Knowledge practiced by individuals if known to individual	K1-I
f) Knowledge practiced by individuals if known to community	K2-I
g) Knowledge practiced by community if known to community	K2-c

- h) Knowledge practiced by community even if details known to individual/s K1-c
- i) Known to community but not practised by individuals or community K2-n
- j) knowledge known to community and accessible to outsiders K2-a
- k) Knowledge known to community and not accessible to outsiders K2-na
- l) Knowledge known to wider public through documentation or otherwise K3
- m) Knowledge known to wider public and practised by only few individual K3-I
- n) knowledge known to wider public and practised by wider public K3-P
- o) Knowledge known to wider public and not practised by any one K3-n

(Own Compilation, Adapted from Gupta, 1999)

Contested Domains of Local Knowledge

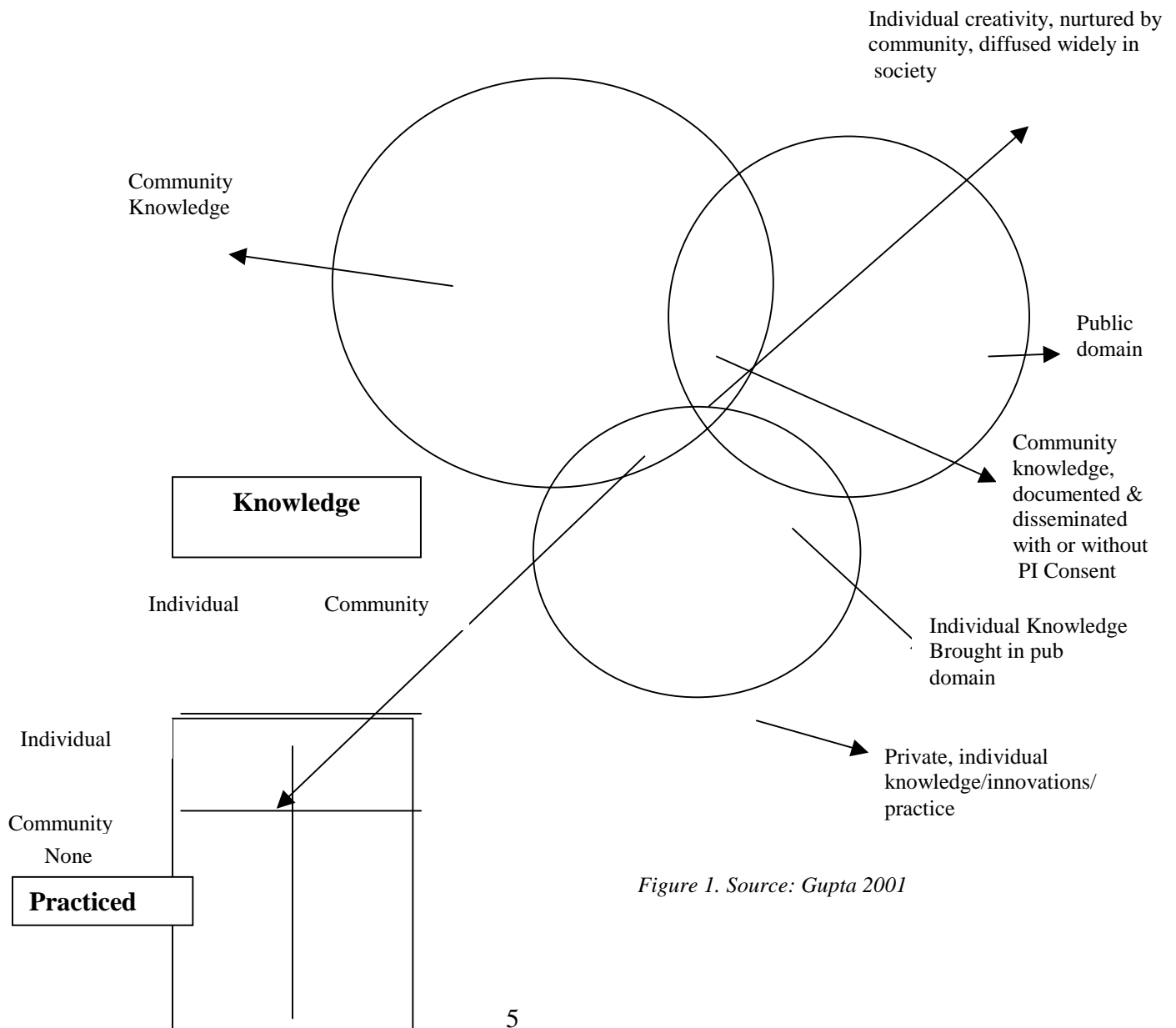


Figure 1. Source: Gupta 2001

The three subsets in figure 1 thus refer to three overlapping domains of knowledge. The contestation emerges when the producers and users of knowledge have unequal access, ability and assurances (Gupta, 1995) about the resources and the benefits emerging out of commercial or non-commercial usage of the resources with or without value addition. The private individuals may have knowledge which they may have inherited from their forefathers (K1), and they may have acquired the skill to practice it faithfully without modification or with modification (K1-wm or m, see table one). The individual contribution in modifying traditional knowledge may be treated according to the same rules as the non-modified knowledge is used, or its use and dissemination may be governed by different rules (K1-sr, K1-dr). Knowledge may be known only to individuals (K1) or to the community (K2) and may be practiced by individuals (K1-I, K2-I) or by the community (K1-C or K2-C), or by none (K1-n or K2-n). In the last case the knowledge because of discontinued use may still be effective or may not be effective. When individual knowledge is shared with the community, its practice may still be restricted to individual experts. There are healers who know how to calibrate the dose and combination of herbal drugs according to the condition of the patient. The general relationship between the plants and their uses in some cases may be known to the community. The experts who produce knowledge and also the contingency conditions under which this knowledge should be used may be free to share their knowledge or may not be free to share their knowledge. Emmanuel and Weijer (2001) provide example of Amish community which may restrict the right of individual members to give consent to participate in a research process. This is not an uncommon case. The communities may circumscribe the conditions under which individuals may or may not be able to share their expert or other knowledge with outsiders or even with other members of the community. There is a famous case in Australia where an art piece designed by a native individual was printed on a currency note by Reserve Bank. The community objected to such use because it argued that the individual did not have rights to assign even individually designed work to outsiders without community's permission since the art work was conceived after rituals and taboos sanctified by the community(Blackney, 2000). There are also taboos implying that a particular remedy might lose its effectiveness if revealed to others. Such a taboo leads to erosion of knowledge when such a knowledge expert dies without ever sharing the secret. The incentives for such knowledge experts to share their knowledge will bring down the transaction costs of external users now or even among the future generation to find such leads for developing various products. But if we argued about the logic of rewarding current generation for knowledge that might have been partially or completely developed by previous generation, we might win the argument and lose the knowledge.

Further, community knowledge may or may not be accessible to outsiders (K2-A and K2-NA). Different communities may have varying capability to produce, reproduce and practice the knowledge for individual or common good. Wider the sharing, greater is the probability of feedback coming from larger number of people and thus

improving the knowledge. At the same time the incentives for individuals to improve such knowledge may go down because such individuals in view of widespread awareness cannot extract the rent. *Some communities govern the access to biodiversity resource by different rules than the access to knowledge about such resources.* The knowledge within a community is therefore not distributed symmetrically. The variability not only influences the power differentials but also the extent of efficiency gains that different members of a community make by using the same knowledge differently. The communities benefit from the individual knowledge and thereby revere the local knowledge experts or healers. But this reverence may not be the sufficient motivator to encourage young people, to acquire this knowledge and take it forward with or without improvement. There may be other factors also such as public policy, media exposure, life style changes etc., which may affect the incentives for younger people to acquire particular knowledge. However, the point remains that the existing set of incentives may need to be modified if traditional knowledge has not only to be conserved but also augmented.

The third set of knowledge system includes public domain knowledge (K3) which may be practiced by individuals, or wider public or not practiced by any one (K3-I, K3-P, K3-n). Ethno biologists, other researchers and firms may document individual and community knowledge and bring this into public domain. Some people have argued that even the community knowledge known only to the members of a village community should be considered public domain knowledge. However, in our view this is not a proper interpretation. From the point of view of protection of intellectual property rights, the knowledge, which is reasonably accessible, can only be considered public domain knowledge and part of prior art. Most of the time the knowledge of people is brought into public domain without the consent of concerned individuals or communities. It is obvious that this way of dealing with people's knowledge is neither fair nor just. What is even more disturbing is the dominant tendency on the part of outside researchers not to share what they have learnt from people back with the same community after value addition in local language.

Honey Bee network has tried to counteract this tendency of making people anonymous by insisting that knowledge providers, producers and reproducers must be acknowledged explicitly and attributed as authors and communicators of the specific knowledge. We should also ensure that whatever is learnt from people is also shared with them in local language so that people to people linkages can also be established. In addition, the Honey Bee philosophy (see <http://www.sristi.org> and sristi.org/knownetgrin.html) also requires sharing by outsiders of any gain that may accrue to them from commercial or non-commercial dissemination of the raw or value added knowledge provided by the communities or individuals. Honey Bee newsletter for last 12 years has tried to propagate this philosophy through SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions) in India and 75 other countries. We strongly believe in the need for protecting intellectual property rights of knowledge rich economically poor individuals and communities. However, to provide such a protection one would have to characterize such knowledge in the manner that the novelty and non-obviousness can be

established. This would mean a comparison with available formal scientific knowledge. The present instruments of IPR can provide limited help in this manner. However, with modifications these instruments can indeed go a long way in protecting the intellectual property of individuals as well as communities. The greatest advantage of this system would be that the people will have incentives to disclose their traditional and contemporary knowledge and make it available to others for learning purposes. Once this knowledge becomes a basis for livelihood, conservation, lateral learning and social networking, a knowledge society starts emerging. Once this happens the public domain provides incentives and not disincentives for individual and communities to share their knowledge after due acknowledgement and protection.

Transition from natural capital to intellectual property

The natural capital has provided the spur for economic progress all through the history, though its role has varied. The natural capital can be governed by social capital, some of which is also ethical capital (Figure 2).

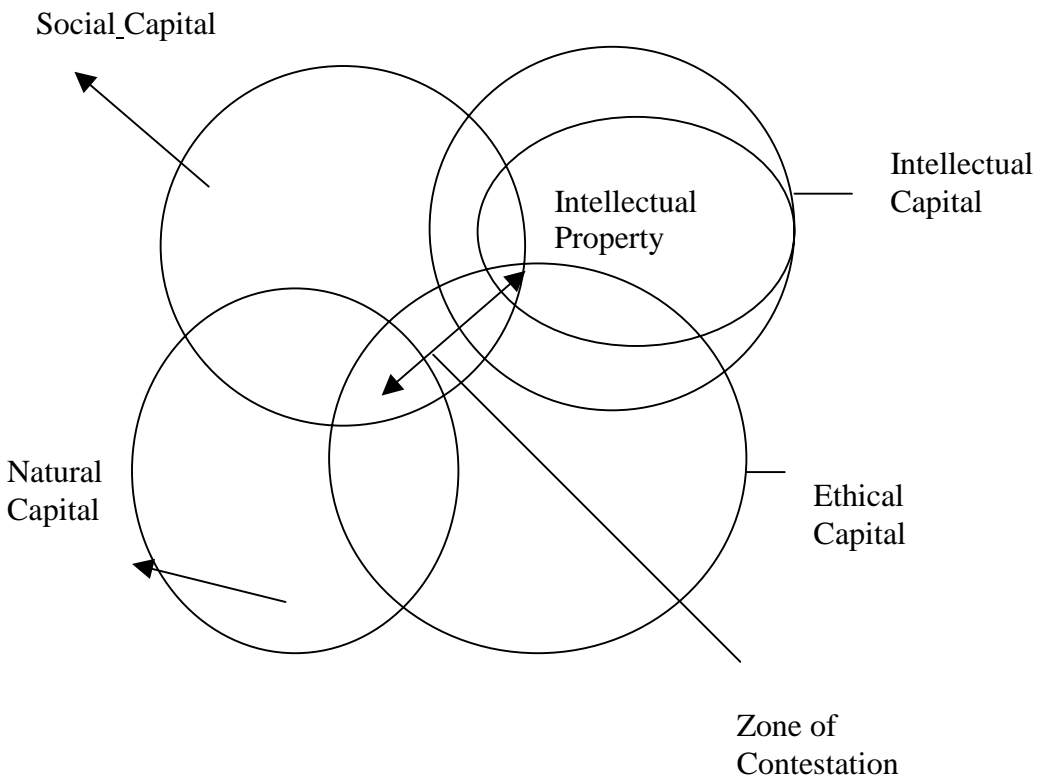


Fig 2. : Source: (Gupta 2001 own compilation)

The social capital in our context could be defined as community based institutional arrangements which help in conservation and reproduction of natural capital. It is essentially a trust based community capital. The ethical capital is essentially such investments and institutional arrangements that may be governed by ethical norms of accountability, transparency, reciprocity and fairness to both human and non-human sentient beings. Some of the ethical capital is a sub-set of social capital. When common property institutions follow ethical values, then the intersection of social and ethical capital takes place. Knowledge about natural capital as well as other kinds of technological and social interactions constitute the intellectual capital which is embodied in literature, data bases, folklore and other kinds of formal and informal sources of wisdom. Part of the intellectual capital constitutes intellectual property from which the knowledge producers can exclude others for a given period of time from commercial exploitation.

The purpose of this discussion is to emphasize that intellectual property is only one means of conserving and augmenting natural resources and associated knowledge systems. Since in the absence of this kind of property it is unlikely that private sector would invest resources to add value to traditional knowledge, the discussion becomes relevant. It is not our contention that private investments can alone help in conserving resources and the knowledge systems. In fact, there is considerable evidence that expansion of market institutions has led to erosion of biodiversity as well as associated knowledge. It is more due to the fact that the traditional knowledge was not valued properly within and outside the communities than due to expansion of market alone. Once a commodity becomes valuable, the bidders would try to appropriate it. Some critiques suggests that commoditization of traditional knowledge is contrary to the local culture and ethical values. This may well be true. However, one has to appreciate that every commodity that local communities and individuals have to buy from the market place has to be paid for. It is an ironical situation that the critics see no impropriety in commoditization of rest of the market in which local communities have no comparative advantage. But in resources in which they are rich, the commoditization is supposed to be disruptive. It is also ignored many times that the concept of intellectual property is not inconsistent with community wide sharing of knowledge for self use. It is only when somebody tries to enrich oneself at the cost of the community or individual innovator that the protection could help. Therefore the communitarian spirit, which has helped conserve resources and generate respect for nature, has to be nurtured. Our contention is that this spirit will give way when options for survival require deforestation or other resource degrading livelihood options because the resource conserving options are not available. *The knowledge based approach to livelihood, and conservation of biosphere regions can indeed be evolved without causing any injury to the local institutions that have helped in conservation so long.*

To illustrate, the three case studies have been recently developed by the author for WIPO to demonstrate the variety of ways in which the role and responsibility of different stakeholders can be identified. For instance, Genetic Resource Recognition Fund was set up at University of California, Davis, to share part of the gains that could have materialised from commercialisation of a cloned gene identified by the scientists from a wild rice originating from Mali. The fund could never take off the ground because of lack of commercialisation of the cloned genes derived from a wild rice from Mali. What is important to understand is that even if resources were there, the benefits might not have gone to the Bela community which really dependent upon the wild rice and was the repository of the local knowledge about it. This community had no land rights and did not belong to the region where this rice was found. However, being poor and dependent on this rice as a source of stress food, it had developed a rich knowledge of its characteristics and interaction with nature. The local communities on the other hand, considered this wild rice as a menace and used herbicides and other methods to eliminate it from the fields. The conventional stereotyped understanding of the stakeholders might have misdirected the potential benefits to communities living around this wild rice having no stake in its conservation. I therefore, argue that the definition of the stakeholders in conservation, utilization and valorization of local knowledge systems should be derived more carefully than has been the case so far.

Another lesson one learns from this case is that voluntary benefit sharing may not really work. Mandatory benefit sharing as attempted in the revised undertaking on plant genetic resources is a move in the right direction. However, the variety of ways in which beneficiaries can be identified needs to be understood so that well intentioned benefit sharing instruments do not end up defeating the purpose. The second case of Kani tribe is much more meaningful from the point of view of benefit sharing. Scientists had discovered a herb used by local tribal community for boosting energy and generating immunity to diseases. They developed a drug, licensed it to an ayurvedic company and fifty per cent of the license fee and royalty were paid into a trust fund of Kani tribe in the region. The lack of willingness of local Forest Department in allowing commercial exploitation of the medicinal herb on which the patented drug was developed has put a question mark on the entire model. The fact, however, remains that a new beginning has been made through establishment of a Trust Fund comprising primarily of the tribal people for sharing the benefits. The scientists concerned who identified the potential and developed and licensed the drug set up a unique example by foregoing their own share from the benefits.

The third case of developing traditional knowledge based drugs in Nigeria is equally interesting because of the diverse ways in which benefits have been shared even before any drug was commercialized. The important lessons are: (a) the benefits have been shared not only with the community which provided the source plant or knowledge for a commercializable drug but with all those who have participated in the process of documentation, (b) the benefits included not just the monetary but also the non-monetary incentives including the capacity building contributions (c) the benefits were intended not just for the individual provider of the information but also

for the entire community and (d) the investments are made in conservation of biodiversity itself apart from the knowledge associated with it. The limitation of the model was that the association of traditional healers had far more weightage or say in the management of institution developed to share benefits compared to the representatives of the local communities.

These examples provide illustration of some ways in which intellectual property rights (IPRs) protection provided possibility of not only sharing incentives with the communities/local experts providing the leads but also with the communities conserving the base resource. The need for protecting IPRs was articulated by Honey Bee network much before GATT and CBD came into existence twelve years ago. It was realised that the only resource in which poor people are rich, can not be made a public domain resource depriving economically poor –knowledge rich communities of their only strength.

Lessons from Honey Bee

Honey Bee does what we, intellectuals, don't do. It pollinates the flowers and takes away the nectar of flowers without impoverishing them. The challenge has been, to define the terms of discourse with the people in which they will not complain when we document their knowledge, they will have the opportunity to learn from each other through local language translations, they will not be anonymous and they will get a share in any wealth that we may accumulate through value addition or otherwise. Honey Bee Network has brought lots of volunteers together who share this philosophy partly or completely and who want to link up with an immense source of energy and inspiration available with the grassroots innovators.

The asymmetry in relative weight which contemporary society places on this resource of grassroots innovations and informal knowledge vis-à-vis formal knowledge and technologies in devising developmental options almost always is skewed in favour of formal science, technology and other linked knowledge systems.

Some evidence of this bias and also few lessons from Honey Bee Network.

a) poverty because of generosity, and consequent knowledge erosion

Unethical exploitation of the local knowledge for centuries leading to capital accumulation in the formal sector without any reciprocity, can not continue for long. Since many of the grassroots innovators conserve nature particularly biodiversity despite remaining poor themselves, share their knowledge with outsiders generously and do not assert their rights, an anomaly has emerged. The youth in the same societies do not want to emulate in the footsteps of their elders. They do not want to be penalized because of superior ethics of their elders who shared their knowledge and remained poor. If some thing was given, it was accepted but a payment for

services was not demanded. There are several consequences. One, the erosion of knowledge is taking place at a very rapid rate, the building block of healing and herbal traditions are getting lost. Many plants are becoming weeds. Just as one cannot locate a book in a library if the catalogue is lost or misplaced, likewise if the knowledge about the plants, their place in nature and uses is lost, one cannot accord them the value they may deserve. There are several other forces accentuating the knowledge erosion such as loosening links between grand parent and grand children generation. But the crucial issue is the loss of respect for this rich source of traditional knowledge. It is taking place precisely because younger generation, exposed as it is to media, and every day news of upward mobility of some ordinary people, does not perhaps want to remain poor because of their superior ethics.

b) Ecological ethics

There are several ways in which ecological ethics has been articulated in the Honey Bee Network constituting ethical capital. Our first encounter with this phenomenon took place seven years ago when we were making a small film on grassroots innovations and outstanding traditional knowledge with the help of Indian Space Research Organization. The photographer and the director of the film, Jayantibhai had accompanied us to a village in north Gujarat to meet a herbal healer namely, Karimbhai. He was extremely poor economically but was very rich in his knowledge and ethical values. When Jayantibhai plucked a particular plant on the road side growing abundantly and asked Karim Bhai to hold it in his hand facing the camera, Karimbhai suddenly became upset. He asked as to why was this plant plucked when there was no immediate need for using it. He could have held this standing plant in his hand. We realized importance of the notion that even a road side plant (which was not endangered or scarce) should not have been plucked unless there was a need for it. This was the value unknown to us till that time. Likewise, we have had many examples of ethical capital manifesting in our network. In drought prone regions, a large number of villages have institutions to collect grains from every household to feed the birds. Despite the fact that birds attack the crops and cause loss, we have never come across farmers killing the birds by poisonous baits or shooting. On the contrary they would rather sit on a raised platform under the scorching sun and scare the birds to save their crops. Variety of birds scaring devices have been developed by the farmers but the taboo on killing birds is widely prevalent. Occasionally, one does come across a single dead bird hanging on a pole to scare the other birds but killing the birds in general does not happen, though there are other tribal communities which do kill the birds and eat them.

All these examples indicate that institutional innovations help in articulating ethical values and accumulating ethical capital in societies trying to live in harmony with nature. It is obvious that this capital base is narrow as evident by the extraordinary serious situation with regard to environmental externalities and many irreversible damages caused by human actions. So long as there remains a hope through continuing living wisdom, one is challenged to explore opportunities for expanding such capital base.

c. Technological innovations to overcome inertia and improve efficiency at grassroots

Honey Bee Network (Gupta, 1991,1995a,b, 1997a,b,c, 1999,2000,) has documented more than ten thousand innovations either of contemporary origin or based on outstanding traditional knowledge primarily from India but also from all parts of the world. Many of these innovations are extremely simple and can improve efficiency of farm workers, women, small farmers, artisans and others a great deal. However, the diffusions of these innovations across language and regional boundaries has been extremely slow despite the fact that Honey Bee newsletter has been coming out in six languages for a decade or more. The result is that young people often grow with assumption that technological solutions to their problems would come from outside and generally from west and rather than evolving from within. The defeatist mentality and pervasive cynicism add to the problem. The lack of micro venture capital prevents transition of small innovations into enterprises. The incentives therefore, remain limited for those who innovate. While micro finance facilities are now available around the world, micro venture finance for small innovations has almost been totally absent. This institutional gap shows the lack of appreciation by the global as well as national public policy institutions of the potential that grassroots innovations have for generating employment, overcoming poverty and conserving biodiversity. The lack of intellectual property protection through specific instruments and legal frameworks designed for helping small innovators may also inhibit the articulation or sharing of innovations.

Despite all these reasons, innovations have indeed been scouted, documented and disseminated by Honey Bee Network and SRISTI (www.sristi.org) over last twelve years. Innovations such as a modified pulley to draw water, a gum scrapper to enable women to gum from thorny bushes or tress, or large number of small machineries, herbal pesticides, veterinary medicines, new plant varieties, agronomic practices or other products have been developed by the unsung heroes of our society without any outside help (www.sristi.org).

d) Linking innovation, investment and enterprise: Micro venture promotion fund

As a follow up of first International Conference on Creativity and Innovations at Grassroots held in January 1997 at IIMA, a regional fund was created in collaboration with Gujarat state government to convert innovations from Honey Bee database into enterprises. GIAN (Gujarat Grassroots Innovation Augmentation Network, www.gian.org) was set up in 1997 to link innovations, investment and enterprise. GIAN has filed patents on behalf of grassroots innovators, incubated several innovations into products, and licensed some of the innovations to entrepreneurs on district wide basis with the license fee going to the innovator (even when patents for the licensed innovation have only been filed and not granted). So far twelve patents have been filed for green grassroots innovations, five technologies have been commercialised, three have been licensed including one to a company in USA.

When CEO of M-cam.com read about Honey Bee network in The Economist and saw some of the innovations in a BBC film entitled 'Patently Obvious' (The BBC world Radio and BBC world program, June and July respectively, 2001), he approached us to inquire as to how he could help. His firm has a very large data base on patents and specialises in prior art searches and also in locating the relevant IPRs linked to each other conceptually and not just literally. He looked at the Honey Bee database of published innovations, practices and traditional knowledge (sristi.org/knownetgrin.html) and one particular innovation caught his attention. He looked at a foot pedal sprayer which increased efficiency by 100percent and reduced energy requirement considerably. He searched for the licensees of foot pedal technology and found out that there were some toy industry people who could be interested in that. He talked to some of the toy industry people, shared the innovation and soon found a firm willing to license the technology. The entire fee went to the innovator. Grassroots innovation found global markets through IP route. The rights for international markets were assigned to this firm but the rights for Indian market were retained by the innovator.

Similarly, a Law firm THT based at Boston offered to file pro bono patents in USA on behalf of grassroots green innovators. This made it possible for five innovators to already reach the final stage of filing of patent. Would they ever have been able to attract more investment or license fee if their innovations had not been patented abroad?

While Honey Bee Network is experimenting with the use of information technology through multi media multi language databases accessible through touch screen kiosks, and web, we are conscious of the limitation information technology has at the current level of infrastructure in making major impact on society. However, an Online data base of 1500 grassroots green innovations (www.sristi.org/knownetgrin.html) has brought several opportunities/enquiries for innovators from unknown investors or entrepreneurs.

e) National and International Register for Innovations and a Clearinghouse for Horizontal Networking and Innovation Market

The transaction costs for innovators around the world to learn from each other and thereby improve the livelihood options, are very high. The popular media and other channels of communication do not pay attention to this source of creativity. Unless we have a clearinghouse in multiple languages and easily accessible in remote areas through internet as well as radio, it will be very difficult to create horizontal networks of grassroots innovators. A step in this direction was taken in India recently. National Innovation Foundation (NIF, WWW.nifindia.org) was set up in March 2000 with a corpus of US 5 million dollar by Indian Department of Science and Technology at Ahmedabad essentially to scale up the Honey Bee model all over the country. NIF is developing a national register of inventions and innovations, linking innovation, investment and enterprise, connecting excellence in formal and informal sciences, setting up incubators and helping in changing the mindset of the society to

ensure respect, recognition and reward for the grassroots innovators. SRISTI has moved a proposal for Global Innovation Foundation (IHT, Oct 11, 2001) primarily to create multi language multi level clearinghouses for networking innovators. However, one of the problems that remain is the protection of intellectual property rights. It will be impossible for traditional knowledge experts and contemporary innovators to pursue standard patent protection where the average cost is about 15 – 20,000 dollars per international patent. The cost of validating the patent in each country every year is extra. There is a provision in the TRIPs as a part of WTO that an international negotiation be initiated to develop a global registry of wines. Obviously, it was done to persuade France to sign the GATT treaty. There is no obvious reason as to why international registry should be restricted only to wines. It should be considered possible to develop track two system of intellectual property protection. Under this, any inventor from any part of the world should be able to register one's innovation or traditional knowledge and get at least 8 to 10 years protection with 3 to 5 claims at a very nominal cost to be paid in national currency at the national IP office. This registry will provide incentive to the millions of knowledge rich, economically poor people to disclose.

NIF has recently awarded scores of green grassroots innovators at the hand of Dy. Chair Planning Commission (Nov 29-30, 2001). In the process, it demonstrated the potential that exists for transforming livelihood as well as conservation options by building upon grassroots innovations. Bamboo teeth made by an innovator in Assam made news not just in India but also in Germany (dec 3, 2001) and elicited response from one of the world's largest and oldest (110 years old) firm in this technology. Innovations in small machines innovations, plant varieties, energy conservation stoves, water heaters, pumps, herbal pesticides, veterinary medicines etc., have been developed by innovators without any help from outside.

Recognizing that the absence of monetary rewards and other opportunities is unlikely to either preserve the resource or the ethics which has helped to conserve the resource so far, we suggest a matrix for combining material and non-material incentives on one side with individual and collectives or communities as targets of reward. Incentives are needed to conserve biodiversity, reward creativity and innovation, generate respect for local institutions and ethical behaviour, and influence the values of future leaders of society.²

The first category of individual material rewards includes the conventional incentives such as patents, license fees, contract fees, monetary rewards for innovations and conservation efforts, etc. It is up to the innovators to decide what to do with their reward. For instance, we know of cases in which individual innovators have refused any private reward. In such cases, one can try setting up a trust fund for collective use of the reward money, under the leadership of individuals whose contributions made this possible. Such a measure generates non-material individual reward in the form of honour or esteem. The accountability of consumers and other members of

² The matrix will generate four kinds of incentives that is material-individual, material-collective, non material-individual and non material-community or collective.

civil society is crucial in generating material incentives for conservation. Ultimately it is the consumers who pay or do not pay for upholding the values which we, as conservators of biodiversity, cherish.

Let me take a simple example in which SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions) and GIAN have been involved over last seven years. In 1996, a small farmer-artisan Amrut Bhai from Pikhore village thought of an idea of developing tilting bullock cart to distribute farm yard manure in the field in furrows directly, The normal practice was to take the manure to the field, pour it out in one corner of the field and then distribute it manually all over the fields. The practice took much time and labor and that too in summer when this practice was followed so that manure could lie in the field for drying for some time. He thought of four wheel cart which would reduce burden on the shoulders of the bullock and also make the task more efficient. Being member of Honey Bee, he shared his idea with us and then SRISTI presented it to some informal experts who saw the merit of the same. Venture promotion support was provided and the cart was ready for commercialization within a year. The patent was filed by GIAN, a venture promotion fund set up by SRISTI and Gujarat Government in 1997. It was assigned by inventor to SRISTI to safeguard his interests and negotiate technology transfer agreements on its behalf. This technology has been transferred to three entrepreneurs for USD 1100(for three districts), USD 1200 for the other two entrepreneurs for five years. Entire amount has gone to innovator and markets were created through publication about tilting cart in Honey Bee news letter and its associated local language versions, other magazines and news papers, display in fairs and through television programs. For a village artisan, having monthly income of about USD200 per month maximum, this amount is quite substantial. Without intellectual property protection, assurance of support from mediating organizations and a positive outlook towards respect for IPP rather than just copying the technology(as used to be the case so far and is still the case in most parts of India as well as other developing countries), this would not have happened. . Without change in the mood and expectations of society on IPP front, an entrepreneur would not dare license the technology for marketing rights restricted to just one or more districts.

The second category, non-material individual incentives, includes honour, recognition, and respect for such individuals who have contributed extraordinarily to the goals of conservation, value addition, or both. SRISTI has honoured about seventy such individuals from different parts of the country, in India. We have also organized biodiversity contests among school children and honoured the most knowledgeable children. Small material prizes accompanied by honour certificate contribute in building respect for local knowledge. Conservation through competition has been a very successful experiment, and has been pursued by SRISTI in different parts of India and the world. Nif has honoured 89 innovators with top prizes and also consolation prizes.

The third category, material and collective incentives, offers enormous scope for experimentation. Several kinds of trust funds, guarantee, risk or ventured capital

funds can be set up to promote conservation, value addition, commercialization, etc. These funds should provide enough flexibility for communities to pursue culture-specific norms of conservation as well as offer reward and/or compensation to outstanding local contributors. Some of these funds will operate at the regional level, while others may be implemented at the community level.

Finally, the fourth category, non-material collective benefits, includes policy reform, institution building, incorporation of local ecological knowledge in the educational curriculum at different levels, development of markets for organic and other local products at national and global level, and more. Although no one incentive may be sufficient to generate the right kind of respect for traditional knowledge and contemporary conservatory innovations, we believe that a combination of these incentives can provide positive, sustainable outcomes.

Part III : Implications for change in the policy and instruments for recognising intellectual capital and property of communities and individuals

It is useful to mention here that property rights in knowledge are generally defined by one's ability to exclude others from commercial utilisation of the protected knowledge for a given period of time. The property right does not necessarily give a right to use that knowledge. In the classical IP sense, the right to use will be determined by other laws obtaining in a country such as food and drug administration or pollution control or mining, etc. It may be useful to mention here that every society has had traditions of intellectual property rights protection in different ways. It is a not new construction as is often assumed. Many people may not know that King Shahjahan who built Taj Mahal in memory of his deceased wife was very keen to protect the design of the monument. He got the thumb of right hand of all the workers cut so that they could never build another Taj Mahal. Likewise, there is an old tradition of textile popularly known as 'patan silk' sarees in Patan region of north Gujarat. There are only three families left maintaining this tradition involving use of vegetative dyes. Some of them reportedly do not share their trade secrets with the daughters who are supposed to go to another family after marriage. Only daughters-in-law are inducted into the tradition. A community in northern Bengal had a tradition of sending an offering of a famous variety of mangoes to the king. They punctured the seed of these mangoes with a very thin needle to ensure that nobody could grow these mangoes without their permission. There are healers who maintain that their knowledge of herbal medicine might lose its effectiveness if shared with anyone. They maintain it as a kind of trade secret. All these examples show that the concept of drawing boundary around the knowledge and resource including biological resource is not a new one. However, there are obvious problems when we use the current IPR instruments for dealing with the creativity, knowledge and innovations produced by small, dispersed individuals or communities dependent upon natural resources for their survival. It is to this problem that we turn to next.

A Genetic Resources and Associated Knowledge Conserved by a Community

Tribal and/or farmer communities conserve various kinds of genetic resources. Many of these resources provide very useful inputs into seed, biotechnology and drug and dyes industry. There are five issues which need to be tackled while revising TRIPS : (i) the land races need to be protected through a registration system at national and international level so that there are incentives for local communities to disclose various properties that they have identified in these plant varieties or local herbs; (ii) the community knowledge should be subject to protection by the communities represented by the village councils or their federation considered for the purposes of the property rights as body corporates; (iii) in cases where the land races and/or the local plants have been documented and incorporated in the national or international gene banks, the responsibility of the biodiversity users to share part of the benefits must be acknowledged so that incentives for conservation are available to the communities. FAO undertaking makes a very important move in this direction. It should be recognised that ex-situ gene banks do contribute to the cause of conservation but these cannot be substitute for in-situ conservation. The biodiversity in the cultivated or uncultivated patches or lakes is under constant selection pressure through socio-cultural interactions. In the absence of any incentives, the rate of erosion of genetic diversity has been quite high. Indian Plant Variety and Farmers Rights Act, 2001 has an interesting provision for a gene fund to share benefits with the conservators of agro biodiversity. It also has a provision for registration of extant varieties by the farmers or NGOs on their behalf; (iv) the new uses of existing diversity should be subject to registration and availability of 'use' patents. Many countries do not permit 'new use' patents. They should reconsider their position if they want to empower local communities to draw benefits from this provision; and

(v) the duration of protection for land races so far as the right to share benefits from commercial use is concerned, one could consider a longer duration than twenty years. The flip side of the coin is that the public sector breeding which has relied on access to the collection in gene bank may get affected if every user had to take prior permission from the community where from the germplasm was originally collected. In many cases, this may not be even feasible. The passport data sheets in gene banks do not include in a large number of research institutions, any information about the village or the local community from where the seeds were collected. In addition, the communities themselves have been having lot of exchanges of genetic material for their own use. Unless all exchanges for public purpose as well as local self-use are excluded from the requirement of any need to take permission from the originating community, the crucible of creativity and conservation may get damaged.

B. Modification in the Implementation of TRIPs

i. First To File:

The developing countries must recognise that 'first to invent' system as used in US might be far more favourable to small, scattered and disadvantaged innovators than

the 'first to file' system. It is necessary to review this provision and ensure that we provide such opportunities to small innovators. After all the disadvantaged innovators cannot win the race to be first compared to corporations and other privileged sections of society.

ii. Every patent applicant must declare that claimed invention is based on material/knowledge obtained *lawfully and rightfully* ensuring due compensation to the providers. The 'lawful' implies compliance with the laws of the country from where the knowledge/resource is accessed. The 'rightful' implies moral duty to have prior informed consent of the provider ensuring equitable benefit sharing, even if the law of the country did not require it.

iii. The community or individual knowledge which is not reasonably accessible, i.e., which has not been coded and/or catalogued in publicly accessible databases should not be considered prior art. Such knowledge should also be considered a patentable subject so long as it meets the novelty criteria.

iv. Grace period. The traditional knowledge shared in good faith by the local healers and herbalists after 1995 should be considered patentable subject by providing a special grace period for the purpose. Generally, only one year grace is provided in US in case the innovation has been published or disseminated.

v. The public domain traditional knowledge be put in a digital library by every country in the region so that issuance of patent to third parties on knowledge already in public domain is avoided. India has already started TKDL (Traditional Knowledge Digital Library) project to avoid issuance of frivolous patents. The US Patent Office has in fact written to Dr.R.A.Mashelkar, Secretary, DSIR (Department of Scientific and Industrial Research), Government of India, requesting for access to such a database so that USPTO can avoid issuing patents on materials like turmeric. Recently, AAAS of USA has approached Honey Bee network for collaboration in creation of an international Database of TK so that frivolous patents are not issued in USA.

vi. Just as collective management systems have been developed for protecting IP in music, songs, performances, etc., institutional innovation is required for collective management of individual product and process patent applications on behalf of small innovators, tribals, local communities so that their transaction costs for seeking such protection can be reduced.

vii. International registry is required as suggested by SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions) either as INSTAR described earlier or some other format with the provision of short-term protection. The emphasis should be on disclosure rather than examination of novelty or non-obviousness. If an innovation is not worthwhile, nobody would license it. A lesson can be learnt in this regard from the practice in Swiss National Patent System.

viii. A national innovation patent system should be developed on the pattern of Australian proposal. In this small innovations are given eight to ten years protection, with maximum five claims, a small fees of less than ten dollars and protection granted within three months. A product patent in this framework may stimulate linkage between innovation, investment and enterprise.

ix. Local language databases on traditional knowledge and patents need to be developed so that local communities can also track any usurpation of their knowledge. In addition, such databases will promote horizontal learning among people. Honey Bee multimedia multi language database provides one kind of template for such a mechanism. Likewise, one can think of decentralised IT kiosks for searching as well as filing applications.

x. National Innovation Foundation as done in India needs to be set up in every country to provide a platform to the small innovators and traditional knowledge experts. Such a Foundation can help in building up national register of innovations and inventions, file applications and provide other micro venture capital support for converting innovations into enterprises.

Geographical indications, trade mark protection, sacred marks protection and many other changes will be necessary to ensure that larger civil society in Asian region sees an opportunity for better livelihood in the emerging IP regime. At this moment, the popular notion is that IP is not for small people. The experience of GIAN (Gujarat Grassroots Innovation Augmentation Network) in India and SRISTI which has filed patents on behalf of grassroots innovators and licensed technologies to generate new wealth in the hands of innovators shows a promise, still be to be realised in most developing countries.

Summing up

There are conservation managers who argue that if economic development of tribal population was allowed to proceed rapidly, the destruction of environment was certain. Logically therefore they plead for keeping people poor to conserve biodiversity. Such a perverse logic fails to notice that livelihood pressures over such communities are taking a heavy toll of their traditional conservation ethics. We have to identify ways of recognising, respecting and rewarding local knowledge, innovations and practices of communities as well as individuals(Gupta, 1989, 1995). In this paper we have taken the earlier discussion of identifying material and non material incentives for individual as well as collective creativity and conservation contributions forward by identifying the contested domains of private, community and public domain knowledge systems. I have also argued that reformed intellectual property right systems can indeed provide one, and we repeat just one, more way of

generating incentives for conservation and augmentation of local knowledge and resources.

We obviously can not conserve biodiversity by keeping people poor and punishing them for their superior ethics.

¹Gupta, 1991, 1995, 1996, 1997