



## **Intellectual Property Rights and the Environment**

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**The Role of Intellectual Property Rights in  
Preserving the Spirit of Innovation, Experimentation  
and the Conservation Ethic at the Grassroots Level**

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UNITED NATIONS

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**The Role of Intellectual Property Rights in  
Preserving the Spirit of Innovation, Experimentation  
and the Conservation Ethic at the Grassroots Level**

By Anil K. Gupta

## NOTE

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## Executive Summary

The central contention of this paper is that intellectual property (IP) instruments are just one of many possible incentives for dealing with material and individual rewards that will preserve the spirit of innovation and the conservation ethic at the grassroots. Conventional intellectual property law grew out of model of innovation over a particular time and place in history and does not necessarily fit in neatly with all traditions of knowledge sharing. However, it must be kept in mind that all societies in the world have from the time immemorial, evolved various means of drawing boundaries around certain kind of knowledge resources—the case of trade secrets among traditional healers. Knowledge systems evolve within a socio-cultural and institutional context, and analysis of the interactions between private, community and public domain knowledge will help us to understand the evolution of knowledge, innovation and practice. The relationship between social, ethical, natural and intellectual capital is also discussed in order to understand the role of incentives, including intellectual property regimes.

Many knowledge systems in developing countries are based upon conservation of the environment and biodiversity resources. A conservation ethic is created within the community and is sustained not only with material incentives but requires spiritual, cultural, institutional and technological innovation, and it is important to understand this relationship. One of the major objections to providing incentives for conservation is that valorizing a resource may increase the possibility of over-exploitation. Some traditional conservationists fear that over-rapid economic development in certain regions of the world will lead to certain destruction of the environment; but clearly conservation of the environment cannot be based on keeping poor people poor. National initiatives must therefore be taken to correct the current distortions in incentive structures for local communities or the erosion of knowledge and resources will continue.

Incentives for the production of knowledge for private use, collective use or public domain use require different analysis.

Additionally, the different domains of knowledge overlap, and contestation occurs when producers and users of knowledge have unequal access. The contested domains of knowledge are analyzed in great detail in an attempt to characterize the knowledge in a way that can establish novelty and non-obviousness, which means a comparison with formal scientific knowledge. The differentiated domains of knowledge interact with varying domains that govern the natural resource regimes in a given area. Thus knowledge about use of a herb or a tree found only in a private garden may exist among the members of a community and in some cases, may be shared widely so as to be in public domain. Likewise, only an individual healer may know about a plant found in a public forest.

Present IP instruments currently provide limited help in this regard, but with sufficient modifications, they may help to provide the incentives and not disincentives for individuals and communities to share their knowledge in the public domain. One of the challenges before policy makers is therefore to identify a portfolio of initiatives that will provide both monetary and non-monetary incentives to individuals and groups engaged in conserving diversity and associated knowledge systems.

The need for protecting IPRs of poor communities was articulated by the Honey Bee Network long before the TRIPS Agreement and the Convention on Biological Diversity (CBD) came into existence. It was recognized that the only resource in which poor people are rich, that is, their knowledge, cannot be made a public domain resource that deprives the economically poor, knowledge rich communities of their one major strength. The organization is based on a philosophy that articulates the seven Es: *Efficiency* (where the role of technology and IP instruments in providing incentive for innovation can be underlined), *Equity*, *Excellence*, *Environment*, *Ethics*, *Education and Empathy*. All the seven Es have to be converged and synergized.

Natural capital has provided the spur for economic progress throughout history, though its role has varied. Natural capital can be governed by social capital, some of which is also ethical capital.

Social capital in the present context could be defined as community based institutional arrangements which help in the conservation and reproduction of natural capital. It is essentially a trust and reciprocity -based capital. The ethical capital is basically such investments and institutional arrangements that may be governed by the ethical norms of accountability, transparency, reciprocity and fairness to both human and non-human 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 constitutes the intellectual capital, which is embodied in literature, databases, 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 from commercial exploitation for a given period of time.

Intellectual property represents only one means of conserving and augmenting natural resources and associated knowledge systems. Three case studies<sup>1</sup> have been recently developed by the author to demonstrate the variety of ways in which the role and responsibility of different stakeholders can be identified. The Honey Bee Network attempts to collect and document knowledge in terms that do not exploit the guardians/owners of that knowledge. It also promotes lateral learning just as bees cross-pollinate the flowers. Contemporary society gives unequal weight to grassroots innovation / informal resources, and formal knowledge systems.

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<sup>1</sup> These case studies were part of a joint WIPO-UNEP pre-publication launch on CD entitled, "A study on the role of intellectual property rights in the sharing of benefits arising from the use of biological resources and associated traditional knowledge", Geneva, 2001. The three case studies are also available from the author as pre-publication working paper drafts: "Value addition to local Kani Tribal Knowledge: Patenting, licensing and benefit sharing", IIMA working paper, August 2002; Gene patents and the Genetic Resource Recognition Fund: Sharing benefits from use of plant genetic resources by agro-biotechnological inventions and traditional agricultural practices, 2002; "Role of IPRs in benefit sharing arrangements: The case of the bioresource development cooperative programme in Nigeria", IIMA working paper, August 2002; "Empowering conservators of biodiversity and associated traditional knowledge: An IP-based framework", IIMA working paper, May, 2002, Ahmedabad.

The Network has outlined evidence of this bias and offers some lessons learned in the process.

Property rights are generally defined by the ability to exclude others from the commercial use of protected knowledge for a given period of time. The right does not necessarily allow for the use of that knowledge – the right to use will be determined by other laws in a country, such as those governing the food and drug administration, pollution, etc. The concept of drawing a boundary around knowledge and resource is not new, but the problems arise when current IPR instruments are used for dealing with the creativity, knowledge and innovation produced by small individuals or communities.

With respect to genetic resources and associated knowledge conserved by a community, the paper outlines five issues that require revision in the WTO TRIPS Agreement. Suggestions for modification in the implementation of TRIPS and national intellectual property rights systems are also presented. Four kinds of incentives – material-individual, non-material-individual, material-collective, non-material-collective have been identified and developed, of which IPRs are just one form of incentive. This paper argues strongly for the need to protect the intellectual property rights of knowledge rich but economically poor individuals and communities by revising existing IP instruments and also developing new models for protecting knowledge that better reflect the needs and traditions of these societies.

## **Abbreviations and Acronyms**

AAAS	American Association for the Advancement of Science
FAO	Food and Agriculture Organization
GIAN	Grassroots Innovation Augmentation Network
IIMA	Indian Institute of Management, Ahmedabad
INSTAR	International Network of Sustainable Technology Applications and Registration
IPRs	Intellectual Property Rights
NIF	India's National Innovation Foundation
SRISTI	Society for Research and Initiatives for Sustainable Technologies and Institutions
TDKL	Traditional Knowledge Digital Library
TRIPS	Trade-Related Aspects of Intellectual Property Rights Agreement
USPTO	US Patent Office



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## **United Nations Environment Programme**

The United Nations Environment Programme (UNEP) is the overall coordinating environmental organization of the United Nations system. Its mission is to provide leadership and encourage partnerships in caring for the environment by inspiring, informing and enabling nations and people to improve their quality of life without compromising that of future generations. In accordance with its mandate, UNEP works to observe, monitor and assess the state of the global environment, and improve our scientific understanding of how environmental change occurs, and in turn, how such changes can be managed by action-oriented national policies and international agreements. UNEP's capacity building work thus centres on helping countries strengthen environmental management in diverse areas including freshwater and land resource management, the conservation and sustainable use of biodiversity, marine and coastal ecosystem management, and cleaner industrial production and eco-efficiency, among many others.

UNEP, which is headquartered in Nairobi, marked its first 25 years of service in 1997. During this time, in partnership with a global array of collaborating organizations, UNEP has achieved major advances in the development of international environmental policy and law, environmental monitoring and assessment, and our understanding of the science of global change. This work has, and continues to support, successful development and implementation of the world's major environmental conventions. In parallel, UNEP administers several multilateral environmental agreements including the Vienna Convention's Montreal Protocol on Substances that Deplete the Ozone Layer, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (SBC), the Convention on Prior Informed Consent procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention, PIC) and most recently, the Cartagena Protocol on Biosafety to

the Convention on Biological Diversity as well as the Stockholm Convention on Persistent Organic Pollutants (POPs).

## **Division of Technology, Industry and Economics**

The mission of the Division of Technology, Industry and Economics (DTIE) is to encourage decision-makers in governments, industry, and business to develop and adopt policies, strategies and practices that are cleaner and safer, use natural resources more efficiently and reduce pollution risks to both human beings and the environment. The approach of DTIE is to raise awareness by fostering international consensus on policies, codes of practice, and economic instruments through capacity-building and information exchange and by means of pilot projects.

## **Economics and Trade Branch**

The Economics and Trade Branch (ETB) is one of the Branches of the Division of Technology, Industry and Economics (DTIE). The work programme of the Branch consists of three main components: economics, trade and financial services. Its mission is to enhance the capacities of countries, particularly developing countries and countries with economies in transition, to integrate environmental considerations in development planning and macroeconomic policies, including trade policies. UNEP's mission in this field is also to address the linkages between environment and financial performance and the potential role of the financial services sector in promoting sustainable development. The trade component of the Programme focuses on improving countries' understanding of the linkages between environment, trade and sustainable development, enhancing their capacities to developing mutually supportive trade and environment policies, and providing technical input to the trade and environment debate through a transparent and a broad-based consultative process.

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## Foreword

It is well recognized that the many approaches to social and economic development are proving inadequate in developing countries. This paper argues for a major shift in the paradigm of development. There is increasing recognition that the chief assets of a community, company or a country are not so much the physical capital but its intellectual capital.

Anil k Gupta argues that one of the most important resources in developing countries, in which poor people are rich, is their knowledge base, and that we often fail to build upon it. The author analyses the complex knowledge systems that have evolved within socio-cultural and institutional contexts and attempts to identify the contested domains of individual, community and public domain knowledge systems. In this way an understanding of the evolution of knowledge, innovation and practices can be arrived at.

Intellectual property rights regimes used to be largely a domestic issue, but the forces of globalization have pushed it onto the world trade agenda, driven primarily by the rich developed nations whose companies hold the majority of the world's patents. But conventional intellectual property law grew out of model of innovation over a particular time in history and does not necessarily fit in neatly with many systems of traditional knowledge whose origins are some times difficult to trace but in other cases can be located over time and space. The World Trade Organization's (WTO) Trade-Related Intellectual Property Rights Agreement (TRIPS) in theory should serve both rich and poor countries alike, but from the author's perspective, it falls far short of its promised benefits to developing countries. The major concerns of developing countries are focused around two main issues – access to medicines (public health), protection of resources (environment), and traditional knowledge.

It is suggested that new models for protecting intellectual capital need to be created that are more relevant to the cultural, spiritual and ethical traditions in developing countries, particularly in terms

of conservation of the environment and biodiversity resources upon which their knowledge systems are based. This paper does not oppose a global patent regime as such, as one of the potential ways of rewarding innovation, but suggests it should be revised to fit more appropriately into the traditions and needs of developing countries. The regime should also operate alongside a portfolio approach to generating material and non –material incentives for individual and communities for conservation.





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# Introduction

Conservation of the environment including biodiversity and associated knowledge systems requires cultural, institutional, and technological innovations besides a deep-seated ethical value set. A conservation ethic cannot be reinforced, rejuvenated and sustained only through material incentives, and that too aimed only at individuals. 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. The increasing pressure on resources not just from the local communities but also from outside stakeholders, naturally cannot be counteracted only by cultural and spiritual values. The material needs for survival

create their own pressures which need 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 the various incentives, including the ones offered by the Intellectual Property Rights regimes, it is important to understand the relationship between technology, institutions and culture. To use a linguistic metaphor, the technology is like words, the institutions like the grammar, production like dialogue/discourse and the culture is the language. In other words, the technology provides the means to change the production function or the ratio of inputs to outputs. The institutions provide the rules, norms and values under which, (a) the choice of inputs to be transformed may be decided,<sup>2</sup> (b) the means through which the transformation is to be achieved,<sup>3</sup> (c) the scale of the exploitation and the various other ways that social existence is achieved.<sup>4</sup> Thus technology provides the building blocks of resource transformation (i.e. production), institutions provide the norms and rules by which this transformation is achieved through collective choice, and culture defines the range of choices that are sanctioned by the community and which are not.

The incentives for technological change and innovation must be reinforced by rules for sustainable consumption, a communitarian<sup>5</sup>

<sup>2</sup> If communities have institutional norms about not extracting biological resources from sacred groves or sacred waters, even though technology for doing the same might exist, communities and individuals might decide against drawing upon such resources. Thus institutions determine the rules by which technology might be used.

<sup>3</sup> Birds are known to be one of the major pests to crops particularly at maturity, and farmers around the world have developed bird-scaring devices. They would rather sit on a raised platform under the hot summer scaring birds or use other means of scaring birds but not kill them either by mixing poison with grains or shooting them. The means of achieving the end, saving the crop, is as important, if not more so, as the end itself. This is an institutional issue, which determines the choice of technology.

<sup>4</sup> In Bhutan, shingle wood for repairing the roof of houses is supposed to be collected on a particular day by the community together so that everyone can monitor each other's collection, ensure that wood is also collected for someone who could not come due to sickness or otherwise and identify the sites for repair of watershed damaged due to landslides or other natural events, save each other on steep slopes if any one fell down and perform many other functions. The scale of harvest is determined by the norms about collective interest in social welfare as well as sustainability of the resources.

<sup>5</sup> An ideology which emphasizes the responsibility of the individual to the community.

## INTRODUCTION

spirit, and a concern for future generations, and these have to be situated in a given cultural and historical context. To further illustrate: A fishing community uses a gill net to catch the fish. It can use a mesh size of two inches, which would trap the smaller fish as well as the bigger fish and adversely affect sustainability. Alternatively it can use a four-inch mesh size so that only the bigger fish would be caught and sustainability would be ensured. The incentive for using the four-inch gill net and the disincentive for using the two-inch gill net would largely emerge from the collective rules evolved by the community. The values, which generate a concern for the future, emerge from a cultural basis of consciousness. There could be many other innovations which improve efficiency: but a focus only on efficiency can sometimes be counterproductive. For instance, some communities use dynamite to catch the fish. Clearly dynamite would kill the small as well as the big fish and is surely a non-sustainable technological innovation. It is beyond dispute that innovations are necessary for improving the technical efficiency of any task, reducing costs, drudgery and improving the return on investment, but in the absence of sustainable institutions<sup>6</sup> and compassionate culture, technological change by itself cannot generate positive environmental outcomes.

There are situations where an absence of institutional conditions can, to some extent, be compensated for by technological innovations. For example, sustainable pest management would require farmers to use a variety of means including crop protection, mixed farming, looking after soil health, using bio-control agents, making collective decisions about sowing dates, varietal choice etc. However, if collective action is not possible, use of non-chemical pest control agents such as herbal pesticides or growing trap crops can help to reduce pest incidence, though the costs could be higher than if everybody cooperates. The interaction between technology and institutions is complex (see Gupta et al., 1997a, Gupta and

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<sup>6</sup> The sustainable institutions refer to the capacity of the institutions to renew their mission, goals and operating principle in the light of changes in resource supply, technological choices and market conditions. Many of the local or indigenous natural resource management institutions have performed the function of calibrating the local norms of resource extraction from time to time so that technological choices are exercised within an institutional boundary.

Sinha, 2001), and this complexity increases further when dealing with the diversity of conditions in which conservation takes place and local knowledge systems evolve, interact and are used for solving problems.

This paper deals with the complexity of knowledge systems that evolve in a socio-cultural and institutional context. The interaction between private, community and public domain knowledge is analysed to assess the ways in which the contributions of different actors in the conservation as well as evolution of knowledge, innovation and practice can be isolated. The relationship between social, ethical, natural and intellectual capital is then discussed in order to highlight the overlap of intellectual property (a small subset of intellectual capital) with natural, ethical and social capital.

The evolution of the Honey Bee Network, which provides a time-tested way of learning from people and adding value to their creative and innovative potential, is then discussed. The paper then focuses on the specific instruments of the Intellectual Property Rights system (henceforth IP system or IP regime) to suggest how the costs of conservation can be supported by a stronger, more accessible and accountable IP regime. The need for changes in the IP system to reduce the transaction costs to small healers, herbalists, and other innovators, as well as their communities, in dealing with the IP system is highlighted.

The central contention of this paper is that IP instruments are only one of the many possible incentives for dealing with material and individual rewards. These by themselves may be necessary but are certainly not sufficient for generating positive outcomes for the environment. The Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI), a voluntary organization supporting the Honey Bee Network, has articulated the seven Es, of which only one deals with *Efficiency* (or enterprise) where the role of technology and IP instruments in providing incentive for innovation can be underlined.

The other Es are, *Equity, Excellence, Environment, Ethics, Education and Empathy*. All the seven Es have to be converged and synergised. Intellectual property instruments play an important but potentially limited role.

# 1

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## **Knowledge Domains: Interface between Individual, Communal and Public Domains**

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

conditions that are far more relevant at local level, although their impacts in some cases may be global. For example, if some endemic and endangered species that have potential for solving some major global health problem do not get protection for want of incentives, then a local conservation problem has a global impact.

One of the major objections to the provision of incentives for conservation is that the higher the valorization, the greater the possibility of over-exploitation. Many of the traditional conservationists are wary of any scheme for adding value to local resources because they fear that such value addition or valorization might make it attractive for local communities to extract resources at a higher rate and thus endanger the resource base itself. They implicitly pass judgment on several human attributes or proclivities, such as the institutional context in which valorization can go hand in hand with better norms of conservation due to a heightened appreciation of the scope for longer term benefits. They disregard the possibility that communities, with the help of local knowledge as well as public-spirited scientists, may develop technologies which require lesser quantities of the physical resource or biological raw material by developing more efficient ways of using the resource.<sup>7</sup>

Development of education, and other "off-nature" (or off-farm) employment alternatives may also reduce dependency on the primary extraction of natural resource and thus lead to fewer people deriving their livelihood from this resource. Although it is paradoxical that while the values of the intellectuals are not supposed to be polluted or distorted by higher incomes, the institutional fabric of poor people is supposed to be so weak that higher incomes are expected to tear it apart. Thus, the moral implication of avoiding valorization of resources (for which IPRs might provide a viable but certainly not the only means or the most efficient means) is to keep people poor so as to conserve biodiversity and other resources (also see Gupta, 1988).

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<sup>7</sup> Such as administering a herbal drug with more efficient delivery systems so that a smaller amount is required to reach the relevant body parts more accurately. Such a mechanism may also reduce the side effects of higher drug dosages where such possibilities exist.

The example of gill nets of four-inch mesh size used by many communities, suggests that institutions can emerge which guide or ensure sustainable resource use even when technological alternatives do otherwise exist and are easily accessible, as in the use of dynamite for killing fish. The implication is not that such institutions will automatically emerge or inevitably follow.

The example of *taxol* is too recent to be ignored: Once the US National Cancer Institute identified *taxol*,<sup>8</sup> to be an important means of developing an anti cancer treatment, the extraction of the bark of this tree lead to excessive harvesting by national corporations in India. One of the major Ayurvedic<sup>9</sup> companies that exported this bark and its extract to the USA later invested in extracting the relevant compound from leaves when almost all the old trees had been harvested in the Shivalic foot hills in north India. This is a clear example of valorization leading to excessive and non-sustainable extraction. The fact that such an example is generally the rule rather than the exception, should not mean that "what is" should become a moral certitude or a cynical inevitability. It is from a failure of the institutions and not the technology or the incentives for developing these valorizing technologies, that such a consequence followed. There are equally strong cases, however, where prospects for long term future income may not only provide the incentive for conservation, but also for augmentation of the biodiversity resource. And 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 both formal and informal sectors is evident all over the world. However, it is also becoming clear that communities and individuals who have contributed towards the conservation of biodiversity and associated knowledge systems are no longer willing to tolerate the current asymmetry. The Convention on Biological Diversity,

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<sup>8</sup> A compound originally extracted from the bark of the Pacific yew tree (*Taxus baccata*).

<sup>9</sup> Traditional Hindu/Indian system of medicine.



the FAO Undertaking on Genetic Resources and Farmers' Rights, and recent discussions of 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 over this continued asymmetry.

It is now 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 for many reasons. One of the most important reasons is the unwillingness of young people to acquire traditional knowledge and improve upon it by blending it with contemporary knowledge, because the incentives are not adequate at present. Whilst the older generation had fewer choices and also a stronger communitarian spirit, the younger generation seems to prefer a more remunerative option, which can compete with other available alternatives. In any case, they do not want to remain poor, which they note was the fate of most of the knowledge-rich traditional knowledge experts.

One of the challenges before policy makers is therefore to identify a portfolio of incentives that will provide both 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 globalizing economy cannot take place entirely on cultural grounds. Institutional support systems are necessary to document, characterize, valorize and incentivize these knowledge systems.
- c. While the role of the community in conserving the resources and the associated knowledge system is most vital, without proper incentives for individual experts and innovators, there

- is not much inducement for specialization and adaptation of the knowledge to changing needs.
- d. The educational system should make a significant contribution in this regard so that esteem for this knowledge system takes shape from the earliest stage i.e primary education.
  - e. The intellectual property rights of individuals and communities have to be protected if benefits are to be generated for the knowledge experts as well as local communities. If knowledge is in the public domain, then there is no need for anyone to pay compensation or offer rewards to providers of such knowledge and/or resources<sup>10</sup>.

Knowledge systems evolve through an interaction between private, public, and community space or domain. Incentives for the production of knowledge for private use, collective use, or for public domain with or without proprietary rights, will have to be analysed differently. In Figure 1, various conditions are described under which these interactions take place.

### *1.1 Contested domains of local knowledge: private, community and public<sup>11</sup>*

Knowledge may be produced by individuals and/or groups, alone or in collaboration (see Figure 1). Some of this knowledge may diffuse only locally, to be characterized as community knowledge, while other knowledge may be disseminated widely between various communities in a region or 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 the public domain. Similarly, individuals may also produce knowledge which they share widely within the community and outside in a manner that the knowledge might become public domain knowledge. On the other hand, some of the knowledge produced by individuals may be kept confidential and accessed only with restrictions. Individual knowledge experts

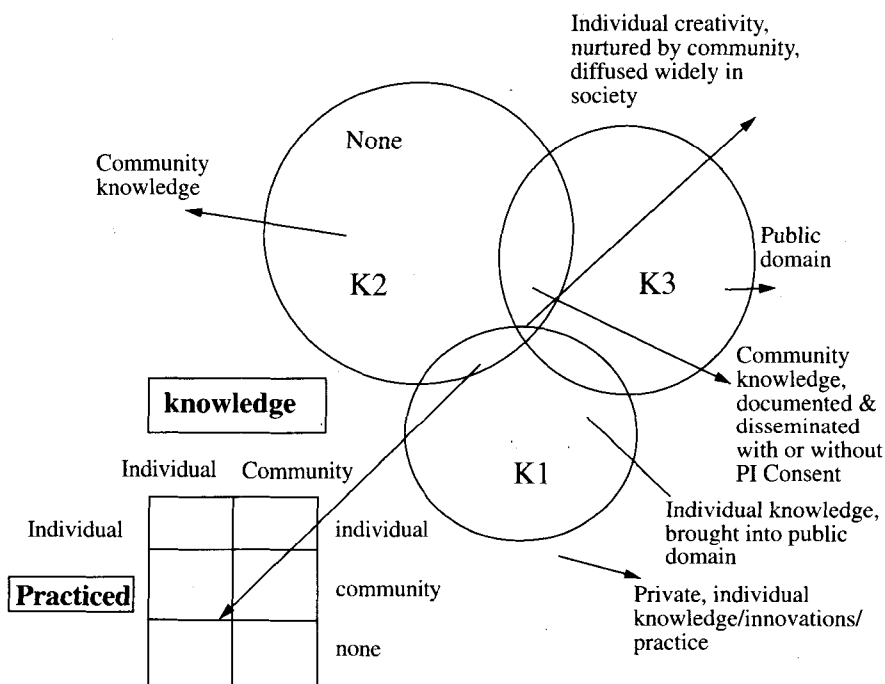
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<sup>10</sup> This is a point which most NGOs and critics of iprs as one of the many incentives, miss. By putting the entire knowledge of the people in the public domain, they lose the case for fair sharing of the benefits even before it has been made.

<sup>11</sup> This section is based on Gupta and Sinha, 2001.

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 acknowledgement for the opportunity to make individual innovations.

**Figure 1: Contested domains of local knowledge**



Source : Gupta, 2001

The three subsets in Figure 1 refer to the three overlapping domains of knowledge. Contestation emerges when the producers and users of knowledge have unequal access, ability and assurance about the resources and the benefits emerging from commercial or non-commercial usage of the resources with or without value addition (Gupta, 1995).

**Table 1 : Contested domains 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 individuals	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 practiced 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 practiced by only few individual	K3-I
n) Knowledge known to wider public and practiced by wider public	K3-P
o) Knowledge known to wider public and not practiced by anyone	K3-n

*Source:* Author's compilation, adapted from Gupta, 1999.

Private individuals may have knowledge which they may have inherited from their forefathers/mothers (K1), and they may have acquired the skill to practice it faithfully with or without modification (K1-m or K1-wm). Individual contributions to modifying traditional knowledge may be treated according to the same rules as the use of non-modified knowledge, 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 no-one (K3-n or K2-n).

In the last cases, the discontinued use of knowledge 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 community may know the general relationship between the plants and their uses in some cases, but the experts who produce the knowledge and also the contingency conditions under which this knowledge should be used, may or may not be free to share their knowledge. Emmanuel and Weijer (2001) provide an example of the Amish community that restricts the right of individual members to give consent to participate in a research process. This is not uncommon. The communities may circumscribe the conditions under which individuals may or may not be able to share their expertise or other knowledge with outsiders or even with other members of the community.

There is a famous case in Australia where an art piece that was designed by a native individual was printed on a currency note by the Reserve Bank. The individual's community objected to such usage because it argued that the individual did not have the right to assign even individually designed work to outsiders without the community's permission since the art work was conceived after rituals and taboos sanctified by the community (Blackney, 2001). There are also taboos that imply a particular remedy might lose its effectiveness if revealed to others. Such a taboo leads to the erosion of knowledge when such a knowledge expert dies without ever sharing the secret. Providing incentives for such knowledge

experts to share their knowledge will bring down the transaction costs of external users now, or even among future generations. *But if we argue against the logic of rewarding the current generation for knowledge that might have been partially or completely developed by previous generations, we might win the argument but lose the knowledge.*

Furthermore, 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 make use of the knowledge for individual or the common good. The wider the sharing, the greater the probability of feedback from large numbers of people, thus improving the knowledge. At the same time, the incentive for individuals to improve such knowledge may be reduced because such individuals, in view of the widespread awareness cannot extract a fee. *Some communities govern the access to biodiversity resources 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 sufficient motivation to encourage young people to acquire this knowledge and take it forward with or without improvement. There may also be other factors 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 is not only to be conserved but also augmented.

The third knowledge system is public domain knowledge (K3) which may be practiced by individuals, the wider public or not practiced by anyone (K3-I, K3-P, K3-n). Ethnobiologists and other researchers and firms, may document individual and community knowledge and bring this into the 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. From the point of view of the protection of intellectual property rights, the knowledge, which is reasonably accessible, can only be considered public domain knowledge and part of "prior art". However, in the author's view this interpretation implies that knowledge known only to a local community but not included in publicly accessible databases cannot be considered a public domain knowledge. Hence, such knowledge should be protectable. Most of the time the knowledge of people is brought into the public domain without the consent of concerned individuals or communities. Clearly this way of dealing with knowledge is neither fair nor just. What is even more disturbing is the overriding tendency on the part of outside researchers not even to share what they have learnt from a community with that same community in their local language, after value addition.

The 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. It should also be guaranteed that whatever is learnt from people is also shared with them in the local language, so that people to people linkages can also be established. In addition, the Honey Bee philosophy (see <http://sristi.org> and [sristi.org/knownetgrin.html](http://sristi.org/knownetgrin.html)) also requires sharing by outsiders of any gain that may accrue to them from either commercial or non-commercial dissemination of the raw or value added knowledge provided by the communities or individuals. The Honey Bee newsletter has tried for the last 15 years to propagate this philosophy through SRISTI and its collaborating institutions (like SEVA, Pritvi, PedS etc...), in India and 75 other countries.

SRISTI strongly believes in the need to protect the intellectual property rights of knowledge rich economically poor individuals and communities. However, to provide such protection, the knowledge would have to be characterized in a manner in which novelty and non-obviousness can be established. This would mean comparison with formal scientific knowledge. The present instruments of IPR can provide limited help in this manner.

KNOWLEDGE DOMAINS:INTERFACE BETWEEN INDIVIDUAL,  
COMMUNAL AND PUBLIC DOMAINS

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 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. When this happens, the public domain provides incentives and not disincentives for individuals and communities to share their knowledge after due acknowledgement and protection.





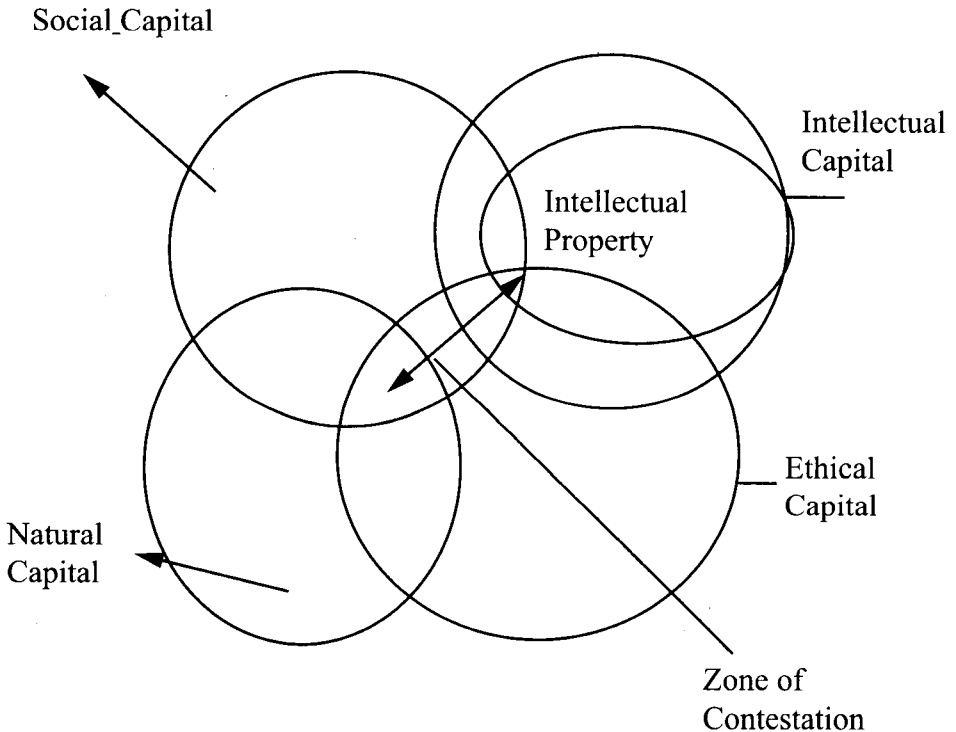
# 2

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## **Transition from Natural Capital to Intellectual Property**

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

**Figure 2: Relationship between natural, social, ethical and intellectual capital and intellectual property**



*Source* Gupta, 2001.

Social capital in the present context could be defined as community based institutional arrangements, which help in the conservation and reproduction of natural capital. It is essentially a trust-based capital. The ethical capital is basically such investments and institutional arrangements that may be governed by the ethical norms of accountability, transparency, reciprocity and fairness to both human and non-human beings. Some of the ethical capital is a sub-set of social capital. When common property institutions

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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 constitutes the intellectual capital, which is embodied in literature, databases, 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 from commercial exploitation for a given period of time.

The purpose of this discussion is to emphasize the fact that intellectual property represents only one means of conserving and augmenting natural resources and associated knowledge systems. But in the absence of this kind of (intellectual) property it is unlikely that the private sector would invest resources to add value to traditional knowledge, generate wealth and share the same with knowledge providers. It is not the contention, however, that private investments alone can help conserve resources and knowledge systems. In fact there is considerable evidence that the expansion of market institutions has led to the erosion of biodiversity as well as associated knowledge. This is more due to the fact that traditional knowledge was not valued properly within and outside the communities than due to the expansion of markets alone. Conversely, once a commodity becomes valuable, the bidders would try to appropriate it. Some critics argue that commodification of traditional knowledge is contrary to the local culture and ethical values. This may well be true. However, it has to be recognized that every commodity that local communities and individuals have to buy from the market place has to be paid for.

It is rather ironical that critics see no impropriety in commodifying the rest of the market in which local communities have no comparative advantage. But in resources in which they are rich, the commodification 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 profit, at the cost of the community or individual innovator, that the protection could help. Therefore the communitarian spirit, which has helped to conserve resources and generate respect for nature, has to be nurtured. It

is contended here 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 the biosphere can indeed be evolved without causing any injury to the local institutions that have helped in its conservation for so long.*

To illustrate, three case studies<sup>12</sup> have been recently developed by the author to demonstrate the variety of ways in which the role and responsibility of the different stakeholders can be identified. The first example is the Genetic Resource Recognition Fund set up at the University of California, Davis, to share part of the gains that could have materialized from the commercialization of a cloned gene identified by scientists from a wild rice (*O. Longistaminata*), originating in Mali. The fund could not be established because of a lack of commercialisation of the gene licensed to a company and also unwillingness of the concerned university to institutionalise this Fund. What is important to understand however, is that even if the resources had been there, the benefits might not have gone to the rightful community (the Bela community) which really depends upon the wild rice and was the repository of the local knowledge about it. This community has no land rights and does 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 where the rice is found, on the

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<sup>12</sup> These case studies were part of a joint WIPO-UNEP pre-publication launch on CD entitled, "A study on the role of intellectual property rights in the sharing of benefits arising from the use of biological resources and associated traditional knowledge", Geneva, 2001. The three case studies are also available from the author as pre-publication working paper drafts: "Value addition to local Kani Tribal Knowledge: Patenting, licensing and benefit sharing", IIMA working paper, August 2002 Gene patents and the Genetic Resource Recognition Fund: Sharing benefits from use of plant genetic resources by agro-biotechnological inventions and traditional agricultural practices, 2002; "Role of IPRs in benefit sharing arrangements: The case of the bioresource development cooperative programme in Nigeria", IIMA working paper, August 2002; "Empowering conservators of biodiversity and associated traditional knowledge: An IP-based framework", IIMA working paper, May, 2002, Ahmedabad. (also see Gupta, A.K. 2003a,b).

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other hand, considered this wild rice a menace and used herbicides and other methods to eliminate it from the fields. The conventional understanding of stakeholders<sup>13</sup> might have misdirected the potential benefits, and the community living off the wild rice would have no stake in its conservation. The identification of the stakeholders in conservation, utilization and valorization of local knowledge systems must therefore be defined more carefully than at present, in terms of their relationship with the resource.

Another lesson learnt 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"<sup>14</sup> is a move in the right direction. However, the variety of ways in which beneficiaries can be identified needs to be clearly understood so that well intentioned benefit sharing instruments do not end up defeating the purpose.

The second example is the case of the Kani Tribe in India, and is much more meaningful from the point of view of benefit sharing. Scientists had discovered a herb used by a local tribal community for boosting energy and generating immunity to disease. They developed a drug, licensed it to an Ayurvedic company and 50 per cent of the license fee and royalty were paid into a Kani Tribe Trust Fund. The unwillingness of the local Forest Department to allow commercial exploitation of the medicinal herb on which the patented drug was developed has put a question mark over the entire model. The fact, remains, however, that a new beginning has been made through the establishment of a Trust Fund for sharing the benefits, comprising primarily of the tribal people. The scientists (Dr Pushpangadan and Dr R Shekhar Reddy of TBGRI then) who

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<sup>13</sup> The conventional understanding is that local communities living around a given resource are the primary stakeholder in its conservation. This generally is true. But this case shows that the local communities considered this rice a weed and wanted to eliminate it by using herbicides or any other means. The true stakeholder was in fact the migrant, landless, economically very disadvantaged and poor community belonging to the Timbuktu region in northern Mali, who were actually responsible for the conservation of this wild rice and all associated knowledge systems. Conventional analysis might have missed this Bela community because it had no rights to land or resource.

<sup>14</sup> Gupta, A. K. 2003a,b.

identified the potential and developed and licensed the drug set a unique example by foregoing their own share of the benefits. The third case, in Nigeria, of developing traditional knowledge based drugs is equally interesting because of the diverse ways in which the benefits were 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 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 the 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 weight in the management of the institution developed to share the benefits compared to the representatives of the local communities.

These examples provide good illustration of some of the ways in which IPRs protection offer the possibility of not only sharing incentives with the communities/local experts providing the leads, but also with the communities conserving the resource base. The need for protecting IPRs was articulated by the Honey Bee Network long before the TRIPS Agreement and the Convention on Biological Diversity (CBD) came into existence. It was recognized that the only resource in which poor people are rich, that is, their knowledge, cannot be made a public domain resource that deprives the economically poor, knowledge rich communities of their one major strength.

### *II.1 Lessons from Honey Bee*

The Honey Bee does what intellectuals don't do – it collects the nectar of flowers without impoverishing them and pollinates them in the process. The challenge has been to define the terms of discourse with the people, so that they will not protest when their knowledge is documented, they will have the opportunity to learn from each other through local language translations, they will not

be anonymous, and they will receive a share in any wealth that may be accumulated through value addition or otherwise. The Honey Bee Network has brought together many volunteers who share this philosophy and who want to link up with the immense source of energy and inspiration available from the grassroots innovators. The asymmetry which contemporary society places on this resource of grassroots innovation and informal knowledge in comparison with formal knowledge and technologies is almost always skewed in favour of formal science, technology and other linked knowledge systems.

*Some evidence of this bias and also a few lessons from the Honey Bee Network*

a) Poverty because of generosity, and consequent knowledge erosion

The unethical exploitation of local knowledge has for centuries led to capital accumulation in the formal sector without any reciprocity, and cannot continue indefinitely. Since many of the grassroots innovators conserve nature, particularly biodiversity, despite remaining poor themselves, and generously share their knowledge with outsiders without asserting their rights, an anomaly has emerged. The youth in the same societies do not want to emulate the footsteps of their elders. They do not want to be penalized for the superior ethics of their elders who shared their knowledge and remained poor. If something 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 blocks of healing and herbal traditions are being 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 their uses are lost, they cannot be accorded the value they may deserve. There are several other forces driving the erosion of knowledge, such as the loosening links between the generations (grandparent and grandchild). But the crucial issue is a loss of respect for this rich source of traditional knowledge. It is taking place precisely because the younger generation, exposed



as it is to the media and daily information of upward mobility of ordinary people, does not perhaps want to remain poor because they are penalised for their superior ethics.

b) Ecological ethics

There are several ways that ecological ethics (constituting ethical capital) have been articulated in the Honey Bee Network. The Network's first encounter with this phenomenon took place seven years ago when making a small film on grassroots innovations and outstanding traditional knowledge with the help of the Indian Space Research Organization. The photographer and director of the film, Jayantibhai had come to a village in north Gujarat to meet a herbal healer, Karimbhai. He was materially extremely poor but was very rich in his knowledge and ethical values. When Jayantibhai plucked a particular plant growing abundantly on the roadside and asked Karimbhai to hold it in his hand and face the camera, Karimbhai suddenly became upset. He asked why was this plant plucked when there was no immediate need for it. He could have held this standing plant in his hand. The importance of the notion that even a roadside plant (which was neither endangered nor scarce) should not have been plucked unless there was a need for it was the unknown value until that time.

Many examples of ethical capital have been manifest in the 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. A variety of bird scaring devices has 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 in general, killing the birds does not happen, other than in some tribal communities which kill the birds and eat them.

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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 apparent that this capital base is narrow as evidenced by the extraordinarily 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, it is a challenge to explore opportunities for expanding such capital base.

c) Technological innovations to overcome inertia and improve efficiency at the grassroots

The Honey Bee Network has documented<sup>15</sup> more than twenty three thousand innovations either of contemporary origin or based on outstanding traditional knowledge, primarily from India, but also from other parts of the world. Many of these innovations are extremely simple and can greatly improve the efficiency of farm workers, women, small farmers, artisans and others. However, diffusion of these innovations across language and regional boundaries has been extremely slow, despite the fact that the Honey Bee newsletter has been issued in eight languages for a decade or more. The result is that young people often grow up with the assumption that technological solutions to their problems come from outside and generally from the west, rather than evolving from within. A defeatist mentality and pervasive cynicism add to the problem. The lack of micro venture capital prevents a 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,<sup>16</sup> micro venture finance for small innovations has been almost totally absent. This institutional gap demonstrates the lack of appreciation by the global as well as national public policy institutions for 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 to help small innovators may also inhibit the articulation or sharing of innovations. That is, innovators may prefer to keep

their knowledge secret.

Despite all this, innovations have indeed been scouted, documented and disseminated by the Honey Bee Network and SRISTI over the last 14 years. Innovations such as a modified pulley to draw water, a gum scraper to enable women to scrape gum from thorny bushes or trees, or a large number of small machines, herbal pesticides, veterinary medicines, new plant varieties, agronomic practices or other products have been developed by the unsung heroes/heroines of our society without any outside help.

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

As a follow up to the first International Conference on Creativity and Innovations at Grassroots held in January 1997 at Indian Institute of Management, Ahmedabad / (IIMA), a regional fund was created in collaboration with Gujarat state government to convert innovations from the Honey Bee database into enterprises. The Gujarat Grassroots Innovation Augmentation Network, (GIAN [www.gian.org](http://www.gian.org))<sup>17</sup> 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 a 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). To date, 12 patents have been filed for green grassroots innovations, five technologies have been commercialised, three have been licensed including one to a company in the USA

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<sup>15</sup> Gupta, 1991, 1995a,b, 1997a,b,c, 1999, 2000.

<sup>16</sup> It is author's point.

<sup>17</sup> National Innovation Foundation has established two more GIANS, i.e. GIAN-north at Science Park in collaboration with state Government of Rajasthan for northern states and GIAN-NE at IIT Gawhati for north-eastern states in 2002. These GIANS work as incubators for adding value to local green innovations as well as traditional knowledge, mobilize micro-venture capital, build linkages with formal institutions of science and technology, diffuse technologies through commercial and non commercial channels, file patents wherever feasible and help in licensing technologies to entrepreneurs through fair contracts or help knowledge holders set up their own enterprises.

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In one case, when the CEO of M-cam.com read about the Honey Bee network in The Economist and saw some of the innovations in a BBC documentary entitled 'Patently Obvious' (BBC World Radio and BBC World TV, June and July respectively, 2001), he made inquiries as to how he could help. His firm has a very large database on patents and specializes 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 and one particular innovation caught his attention, a foot pedal sprayer which increased efficiency by 100 per cent 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. 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 the IP route. The rights for international markets were assigned to this firm, but the rights for the Indian market were retained by the innovator.

Similarly, a Boston-based law firm, THT, offered to file pro bono patents in the USA on behalf of green grassroots innovators. Of the five patents filed in USA in the name of grassroots innovators with the pro bono help of a IPR firm in Boston, THT, one has already been granted on April 8, 2003. Would they ever have been able to attract more investment or license fees if their innovations had not been patented abroad?

While the Honey Bee Network is experimenting with the use of information technology through multi media multi language databases accessible through touch screen kiosks, and world wide web, it is conscious of the limitation information technology has at the current level of infrastructure in terms of making a major impact on society. However, an online database of 1,500 green grassroots innovations has created several opportunities/enquiries for the innovators from unknown investors or entrepreneurs ([www.sristi.org/knownetgrin.html](http://www.sristi.org/knownetgrin.html)).

The Indian finance minister announced in his February 2002 budget speech to the Indian Parliament the setting up of a National Micro Venture Fund by SIDBI (Small Scale Industry Bank of India), in consultation with NIF, as a result of a suggestion of the Honey Bee Network. Is it not strange that while there is micro finance all over the world (with the World Bank investing millions of dollars in this venture), there is a total absence of micro incubation and venture finance green funds anywhere in India except through GIANS. Such a global policy omission can only be explained by an apparent lack of faith that international environment and development institutions have in the potential for generating jobs and overcoming poverty through respect, recognition and reward (and valorization) of green grassroots innovations and traditional knowledge (TK). Or maybe these institutions genuinely believe that while venture capital is vital and essential for high-tech innovations, it is not necessary for green grassroots innovations and TK.<sup>18</sup>

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 the 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. The National Innovation Foundation (NIF, [www.nifindia.org](http://www.nifindia.org)) was set up in March 2000

with a grant of US\$ 5 million by the Indian Department of Science and Technology in Ahmedabad, essentially to scale up the

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<sup>18</sup> Author's note: I have no doubt that eventually, the logic of what the Honey Bee stands for will force policy change at national as well as international levels. It is inconceivable that the technological needs for conservation, resource augmentation and benefit sharing can be met without giving boost to local creativity and innovative potential and TK.

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Honey Bee model all over the country. The 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 change the mindset of society to ensure respect, recognition and reward for the grassroots innovators. SRISTI has moved a proposal for a Global Innovation Foundation (IHT, 11 October 2001) primarily to create multi language multi level clearinghouses for networking innovators.

However, one of the problems that remains is the protection of intellectual property rights. It will be impossible for traditional knowledge experts and contemporary innovators to pursue standard patent protection when the average cost is about US\$15 –20,000 per international patent. The cost of maintaining the patent in each country every year is extra. There is a provision in the WTO TRIPS Agreement, that an international negotiation be initiated to develop a global registry of wines. Clearly it was done to persuade wine producing countries like France to sign the GATT Uruguay Round Agreement. There is no obvious reason why an international registry should be restricted only to wines. It should be considered possible to develop a two-track system of intellectual property protection. Under this, any inventor from any part of the world should be able to register his or her innovation or traditional knowledge and get at least 8 to 10 years protection with 3 to 5 claims at a nominal cost to be paid at the national IP office in national currency<sup>19</sup>. This registry would provide an incentive to the millions of knowledge rich, economically poor people to disclose their knowledge, innovations and practices.

NIF has recently awarded scores of green grassroots innovators and tradition knowledge holders through the Dy. Chairperson Planning Commission (29-30 November 2001) and Honourable President of

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<sup>19</sup> Australia has developed an Innovation Patent system for small innovators and inventors. It was done because small enterprises may not be able to license standard patents. Unless they develop innovations or license the same at costs that they can afford, they cannot become innovative and competitive. Given the fact that they generate the most jobs, their viability through the second track patent system is most vital.

India (December 17, 2003). In the process, it was demonstrated that the potential 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 (3 December 2001) and elicited interest from one of the world's largest and oldest (110 years old) firms in this technology.

Recognizing that the absence of monetary rewards or other opportunities is unlikely to either preserve the resource or the ethics which has helped to conserve the resource so far, a matrix is suggested for combining material and non-material incentives with the individual or the community as the recipient of reward. The matrix will generate four kinds of incentives, that is material-individual, material-collective, non material-individual and non material-collective. 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.

material-individual	non-material-individual
material-collective	non-material-collective

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.<sup>20</sup> In such cases, a trust fund could be set up for collective use of the reward money, under the leadership of the individuals whose contributions made this possible. Such a measure generates non-material individual reward in the form

<sup>20</sup> Once in a biodiversity contest, we offered some utensils as a gift to Karim Bhai, a Muslim healer for his outstanding knowledge. He refused the gift. He was a potter and he would accept payment for pots that we might purchase from him but he was reluctant to accept any reward for sharing his knowledge with us.

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of honour or esteem. The accountability of consumers and other members of 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 conserve and cherish biodiversity.

To present a simple example in which SRISTI and GIAN have been involved over last seven years. In 1996, a small farmer-artisan, Amrut Bhai from Pikhore village came up with the idea of developing a tilting bullock cart to distribute farmyard manure directly into the fields and furrows. The normal practice was to take the manure to the field, tip it into one corner of the field and then distribute it manually all over the fields. The practice takes much time and labour, and that too in summer when this practice was followed so that manure could lie in the fields drying for some time. He designed a four-wheel cart that would reduce the burden on the shoulders of the bullock and also make the task more efficient. Being member of Honey Bee, he shared his idea with them and then SRISTI presented it to some informal experts who saw the merit of the idea. 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 the inventor to SRISTI to safeguard his interests and negotiate technology transfer agreements on his behalf. This technology has been transferred to three entrepreneurs for US\$1,100 (for three districts), and US\$1,200 for the other two entrepreneurs for five years. The entire amount has gone to the innovator and markets were created through publication in the Honey Bee Newsletter and its associated local language versions, other magazines and newspapers, displays in fairs and through television programmes. For a village artisan with a monthly income of about US\$200, this amount is quite substantial. Without intellectual property protection, assurance of support from mediating organizations and a positive outlook towards respect for IPRs rather than just copying the technology (as used to be the case and still is the case in most parts of India as well as other developing countries), this would not have happened. Without a change in the attitude and expectations of society on IPRs, an entrepreneur would not dare to 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 70 such individuals from all over India. SRISTI has also organized biodiversity contests among school children and honoured the most knowledgeable children. Small material prizes accompanied by an honour certificate contribute to building respect for local knowledge. Conservation through competition has been a very successful experiment, and has been pursued by SRISTI in India and different parts of the world. NIF has honoured 89 innovators with top prizes as well as many runner-up prizes.

The third category, material-collective incentives, offers enormous scope for experimentation. Several kinds of trust funds - guaranteed, risk or ventured capital funds - could 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 conservation-oriented innovation, a combination of these incentives can provide positive, sustainable outcomes.

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## **Implications for Change in Policy and Instruments for Recognizing Intellectual Capital and Property**

It is useful to mention here that property rights in knowledge are generally defined by the ability to exclude others from commercial utilization 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 in a country such as the food and drug administration, pollution control or mining, etc. It should be mentioned here that to date every society has had different traditions of intellectual property rights protection. It is a not new construct as is often assumed. For example, King Shahjahan who built the Taj Mahal in memory of his deceased wife was very keen to protect the design of the monument, so 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 production popularly known as 'patan silk' used for sarees in the Patan region of north Gujarat. There are only three families left who maintain this tradition involving use of vegetable 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 reportedly 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, so it is maintained as a kind of trade secret. All these examples show that the concept of drawing a boundary around the use of knowledge and resources, including biological resources is not a new one. However, there are obvious problems when using the current IPR instruments for dealing with creativity, knowledge and innovations produced by dispersed individuals or communities dependent upon natural resources for their survival. It is this problem that is now addressed.

*A. Genetic resources and associated knowledge conserved by a community*

Tribal and/or farming communities conserve various kinds of genetic resources. Many of these resources provide very useful

inputs into seed, biotechnology and drug and dyes industries. There are five issues which need to be tackled for revising the WTO TRIPS Agreement:

- the land races or farmers' varieties 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;
- the community knowledge should be subject to protection by representation from the village councils or a village federation, considered for the purposes of property rights, as corporate bodies;
- 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 some of the benefits must be acknowledged so that incentives for conservation are available to the communities.<sup>21</sup>
- the new uses of existing biodiversity should be subject to registration and 'availability of use' patents;<sup>22</sup>
- the duration of protection for land races, so far as the right to share benefits from commercial use is concerned, should 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 banks may be affected if every user had to obtain prior permission from the community where the germplasm was originally collected. In many cases,

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<sup>21</sup> The FAO undertaking makes a very important move in this direction. It should be recognized that *ex-situ* gene banks do contribute to the cause of conservation, but these cannot be substituted 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. The 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.

<sup>22</sup> 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.

this may not even be feasible. The passport data sheets in gene banks of a large number of research institutions do not include any information about the village or the local community from where the seeds were collected. In addition, the communities themselves have received a 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 get permission from the originating community, the crucible of creativity and conservation may become damaged.

*B. Modification in the implementation of TRIPS and national intellectual property rights systems*

These recommendations are based on the author's research on the subject over last decade and a half. There are many other recommendations which can be seen elsewhere.<sup>23</sup>

i) First To File: The developing countries must recognize 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 far better endowed sections of society.

ii) Every patent applicant must declare that the 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 the moral duty to obtain prior informed consent of the provider and 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

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<sup>23</sup> For critical appraisal, readers can refer to various papers (and also national legislations or draft bills on the subject in India) at <http://www.sristi.org/pub.html>

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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 to providing a special grace period for the purpose. Generally, only one year grace is provided in the US in case the innovation has been published or disseminated prior to filing the patent application.

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

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

vii) An international registry is required as suggested by SRISTI, either as International Network of Sustainable Technology Applications and Registration (INSTAR) described earlier (see SRISTI, 1993 and Gupta, 1990, 1991) 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 the Swiss National Patent System.

viii) A national innovation patent system should be developed on the pattern of the Australian policy. In this, small innovations are given eight to ten years protection, with a maximum of five claims, a small fee of less than US\$10, and protection granted within three months. A product patent in this framework may stimulate linkage between innovation, investment and enterprise. The transaction costs for small innovators and inventors will be reduced on the one hand and at the same time, potential investors and entrepreneurs (who will in fact provide the real benefits through shared benefits) will also be able to access new green investable innovations as well as outstanding traditional knowledge at low cost.

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. The Honey Bee multimedia multi-language database provides one kind of template for such a mechanism. Likewise, one can think of decentralized IT kiosks for searching as well as filing applications.

x) A National Innovation Foundation ([www.nifindia.org](http://www.nifindia.org)) as established in India, needs to be set up in every country to provide a platform to the small innovators and traditional knowledge experts. Such foundations can help in building up a national register of innovations and inventions, file applications and provide other micro-venture capital support for converting innovations into enterprises.

Geographical indications, trademark protection, sacred marks protection and many other changes will be necessary to ensure that civil society in various regions sees the opportunity for a better livelihood in the emerging IP regime. Currently, the popular notion is that IP is not for small people. The experience of GIAN (Gujarat Grassroots Innovation Augmentation Network and now called GIAN-west) and SRISTI (and NIF) who have filed patents

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on behalf of grassroots innovators, and licensed technologies to generate new wealth in the hands of innovators shows much promise, still to be realized in most developing countries.





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## **Conclusions**

There are conservation managers and policy advocates who argue that if economic development of tribal populations and other conservators of biodiversity were allowed to proceed rapidly, then destruction of the environment was certain. Therefore they logically plead for keeping people poor to conserve biodiversity. Such a perverse logic fails to acknowledge that livelihood pressures over such communities are also taking a heavy toll on their traditional conservation ethics. Ways of recognizing, respecting and rewarding local knowledge, innovations and practices of communities as well as individuals must therefore be identified

(Gupta, 1995a). This paper has taken forward earlier discussions on identifying material and non-material incentives for individual as well as collective creativity and conservation contributions, by identifying the contested domains of private, community and public domain knowledge systems. The paper also argues that reformed IPR systems along with some new institutional innovations can indeed provide *one* way of generating incentives for conservation and augmentation of local knowledge and resources.

Biodiversity obviously cannot be conserved by keeping poor people poor and penalizing them for their superior ethics. It has to be recognized that most national governments do not even raise sufficient revenues to pay the salaries of the staff they already have, and to expect them to share benefits with conservators of natural resources like biodiversity and associated knowledge systems, is rather a far fetched hope. The deficit in their budget is unfortunately squeezing public investments even in the essential sectors that the private sector might not invest in or might not do so sufficiently. These are precisely the regions in which some of the poorest people live.

The argument put forward in this paper is for a shift in the paradigm of development by building upon a resource in which poor people are rich, that is, their ethics, institutions, and technological and socio-ecological knowledge. This will require the development of a portfolio approach to generating incentives for conservation. Amongst the four kinds of incentives (material-individual, material-collective, non-material-individual and non-material-collective), intellectual property rights protection is only one kind of material incentive for individuals or communities. These incentives alone might not spur the three goals of the CBD i.e., conservation, sustainable utilization, and equitable sharing of benefits, without also attaching or augmenting collective resource management institutions and reinforcing conservation ethics at the individual level. However, these incentives in some cases might unlock the entrepreneurial energy, hidden and suppressed in most developing countries for so long, by helping to link innovation, investment and enterprise.

## CONCLUSION

It is clear that most of the problems of developing countries will not be solved in the laboratories of European or other western countries. The local innovator/genius will have to accomplish this daunting task alone and through knowledge networks of likeminded laboratories and incubation centres in the west. Too much emphasis on just technology transfer rather than local green technology development is a misplaced strategy. The way ahead should be based on the harnessing of the thousands of examples of knowledge, innovations and practices of local communities and individuals, as demonstrated by the Honey Bee Network. IPRs can play a small role in the development of this value chain. This option should not be denied to those who wish to benefit from the rewards of their intellectual capital. It is true that the TRIPS Agreement as it exists today, and the national laws currently in vogue in most countries will require tremendous changes if private entrepreneurial energy has to be augmented by public and private sector research and development and investment institutions in a self reliant manner. Will knowledge-rich, economically poor people be helped to realize their dreams through their own creativity, or will they be abandoned to indifferent bureaucracies, unimaginative leaders, short-sighted market forces and sometimes even patronizing NGOs? There is no doubt that the way forward should be empowerment of the creative and innovative communities and individuals explicit in this paper.

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