

WIPO/ECTK/SOF/01/3.8

ORIGINAL: English

DATE: May 2001



THE PRESIDENT OF THE  
REPUBLIC OF BULGARIA



WORLD INTELLECTUAL  
PROPERTY ORGANIZATION

**INTERNATIONAL CONFERENCE ON  
INTELLECTUAL PROPERTY, THE INTERNET,  
ELECTRONIC COMMERCE AND TRADITIONAL KNOWLEDGE**

organized  
under the auspices of  
His Excellency Mr. Petar Stoyanov, President of the Republic of Bulgaria  
by  
the World Intellectual Property Organization (WIPO)  
in cooperation with  
the National Intellectual Property Association of Bulgaria

**Boyana Government Residence  
Sofia, May 29 to 31, 2001**

INTELLECTUAL PROPERTY, TRADITIONAL KNOWLEDGE AND GENETIC  
RESOURCES  
CONSERVING BIODIVERSITY AND REWARDING ASSOCIATED KNOWLEDGE  
AND INNOVATION SYSTEMS: HONEY BEE PERSPECTIVE

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THIS PAPER WAS SENT AS A CONTRIBUTION TO THE CONFERENCE PROGRAM

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<sup>2</sup> Paper presented at First Commonwealth Science Forum - Access, Bioprospecting, Intellectual Property Rights and Benefit Sharing and the Commonwealth, Goa, 23-25 September 1999. This is a considerably revised and expanded version of the paper presented at World Trade Forum, Bern, August 27-29, 1999.

Economic development in different regions has often been accompanied by a decline in biodiversity. Biotechnology and other value adding technologies offer a possibility of valorizing biodiversity. But the distribution of the gains among different stakeholders generated through added value obviously is the function of institutional arrangements. The kind of ethical practices followed by bioprospectors may determine whether or not the benefits of biotechnological products are shared fairly among different stakeholders.

The need for a low transaction cost system is obvious and yet most global dialogues on intellectual property rights have not yet embarked upon such a system. In the forthcoming review of the Trade-Related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organization (WTO), a discussion on Article 23 providing for negotiations on the establishment of a multilateral system of notification and registration of geographical indications in the context of wines is proposed. There is no reason why such a discussion should be restricted only to the wines and not include traditional knowledge as well as contemporary innovations of local communities and individuals.

There are many other policies and institutional modifications that are called for in the IPR laws. It is not my argument that removing the imperfections in IPR regime will by itself generate economic rewards and social esteem for local knowledge rich economically poor people. I realize that the role of non-monetary incentives may be sometime more important. However, the biotechnology, drug, and other value adding industries have yet not shown any explicit interest as a stakeholder in generating models of voluntary benefit sharing. Does it imply that they believe that future gains in biotechnological products may be made only on the basis of public domain biodiversity?

The empowerment of local knowledge experts will require building bridges between the excellence in formal and informal science. Reform of TRIPS thus is a process involving reform of knowledge producing and networking institutions in any society.

## INTRODUCTION

The asymmetry in rights and responsibilities of those who produce knowledge particularly in the informal sector and those who valorize it (in the formal sector) has become one of the most serious contentious issues. I will begin with four case lets to illustrate the interface between the traditional and contemporary knowledge and global trade. I will then demonstrate that there are possibilities of securing the interests of grassroots innovators and traditional communities within the global trade regime provided the ethics of extraction can be factored in the calculation of respective incentives or disincentives for cooperation among different stakeholders. To do so, some of the fast emerging and expanding technologies like Information Communication Technologies (ICTs) will have to be adapted to the needs of local communities and individual grassroots innovators. Lastly, I will summarize the policy changes that need to be negotiated in the next round of review of TRIPS and some other trade agreements having bearing on incentives for local innovations and growth of traditional knowledge and institutions.

## I. LESSONS FROM WHAT HAS HAPPENED

### Case I: The intellectual property in herbal products: Why has the center of the world moved eastward?

The import of the fact that almost forty five per cent of the herbal patents in USPTO till 1998 were owned by Chinese, another twenty per cent by Japanese and about sixteen per cent by Russians has not been properly appreciated<sup>3</sup>. Chinese leadership in herbal products proves that with the right kind of incentives, even a developing country can achieve global pre-eminence. Not only that, the first hundred assignees were individuals and not corporations. The notion that R&D by small-scale firms or individual scientists cannot generate globally valuable intellectual property is not true. It is said that one in every five north Americans has used Chinese medicine. The traditional Chinese medicine has succeeded in capturing global markets through available trade routes. How has it happened? Whether this is a replicable model? To what extent has this trade helped the local communities and individual herbalists in China? Is there a reason to hope that the erosion of traditional knowledge will be stemmed because of the emergence of market and valorization of the knowledge? Maybe answers to many of these questions may not be positive. And yet, simply because not all problems have been solved, the example should not deter us from solving at least some problems to begin with. Caution has to be exercised that if those stakeholders whose problems get solved first (for instance, traders or petty manufacturers), they should not become complacent towards solving the problem of other stakeholders such as herbalists, local communities, conservators of biodiversity in wild as well as domesticated domains.

### Case II: Genetic Resources Recognition Fund at UC, Davis: Viability of voluntary sharing of benefits<sup>4</sup>

When Pamela Ronald, a pathologist at UC, Davis cloned a gene which conferred resistance to a major disease of rice, i.e. blast and licensed it to two companies, she was keen to find out an ethical way of sharing benefits that might arise from commercialization of the intellectual property. She realized that the wild rice (*O. longistaminata*) from which the gene was isolated and cloned originated from Mali, from where it had gone to Central Rice Research Institute, India, and in turn to International Rice Research Institute. The characterization and identification of the gene in question (XA 21) took place at IRRI. She met with Prof. Barton and conceptualized the Genetic Resource Recognition Fund (GRRF) in which part of the one time royalty from the companies would be credited apart from contribution from UC, Davis so as to provide fellowships to the students from Mali and other developing countries. It is true that no money has yet been put in this fund because the companies concerned have not as yet decided to commercialize the gene through its insertion in various rice varieties. Hence, no fellowship has yet been given. The top management of UC, Davis campus is conscious of the fact that this idea has not been mainstreamed, and thus has not been institutionalized for similar other transactions taking place at this campus or at other University of California campuses. They have not been able to even accept this issue for policy change. In their view, it is up to each scientist whether she/he would like to share any benefit with knowledge or resource providers or not from respective share of gains.

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<sup>3</sup> I am grateful to Keith Richardson of Derwent Pharmaceutical database for sharing this data with me.

<sup>4</sup> This and the other cases of Kani Tribe and Honey bee network are being developed further as a part of WIPO supported study on Role of Intellectual Property Rights in Benefit Sharing.

Assuming that not many scientists agree to put a part of their income coupled with the share of the university in this fund, the idea will remain an isolated but outstanding example of individual good conscience. Can such voluntary examples show the way for future? Can these models be replicated through reforms at higher level, i.e., in the intergovernmental negotiations on TRIPS and trade? Whether the postgraduate fellowships to the students from the gene donor country will be a good means of sharing benefits and providing incentives for in situ conservation? To what extent the amount proposed in this fund is optimal?

There can be many more questions. And yet, the issue remains that the individuals can make a difference, change the perspective and generate hope. To what extent can such models provide a basis for influencing the trade negotiations in genes? Is it possible that while generating global solutions we do not constrict the space for creative solutions, no matter how isolated and non-replicated these are?

### Case III: Commercializing traditional knowledge of Kani tribe

Tropical Botanical Garden Research Institute (TBGRI) has been doing research on herbal drugs for a long time like many other botanical institutions. Dr. Pushpangandan being the coordinator of the national project on ethno botany and then the Director of this Institute, was well aware of the potential of indigenous knowledge of herbal drugs. He and his colleagues identified a drug from the traditional knowledge collected as a part of their study and filed a patent on the same. An Ayurvedic drug company got interested in the commercialization of this drug and accordingly licensed the right to manufacture and market. Dr. Pushpangandan discussed various ways of sharing the benefits with me and accordingly decided to set up a trust fund for the tribe. He chose this route in preference to the transferring of the benefits to a public sector tribal development corporation. There was criticism of his attempt to share benefits suggesting either inadequacy, lack of widespread involvement of Kani or that TBGRI did not hire enough Kani people or even paid them well. There was no criticism of thousands of researchers in public and private sectors who have been using traditional knowledge without any reciprocity whatsoever. The consciousness of Kani tribe about their own knowledge and need for its conservation and application has increased manifold. Dr. Pushpangandan had been working on many plants and realized the need for sharing benefits only because of the current global and national concern.

Whether the amount of benefit was adequate or not is an important issue but not the most important one. To what extent Kanis will become conscious of their rights and responsibilities is a more important question. Whether a voluntary decision of this kind will bring about change in the behavior of other public and private sector users of traditional knowledge within India is again an open question. It is interesting that lot of NGOs and others who see MNCs as the biggest enemy of the nation do not realize that for poor tribal, it is no solace whether a domestic company or international company exploits them. Globalization of ethical responsibility is an imperative.

### Case IV: Honey Bee Network transforms paradigm of benefit sharing: The case of monetary and non-monetary incentives for communities and innovators

The Honey Bee Network evolved ten years ago in response to an extraordinary discomfort with my own conduct and professional accountability towards those whose knowledge I had written about and benefited from. I realized that my conduct was no different from other exploiters of rural disadvantaged people such as moneylenders, landlords, traders, etc. They exploited the poor in the respective resource markets and I exploited the

people in idea market. Most of my work had remained in English and thus was accessible to only those who knew this language. While I did share findings of my research always with the providers of knowledge through informal meetings and workshops, the fact remained that I sought legitimacy for my work primarily through publications and that too in English and in international journals or books. The income, which had accrued to me, had not been shared explicitly with the providers of the knowledge. I had argued with myself that I have spent so much time and energy in policy advocacy on behalf of the knowledge-rich, economically poor people. But all this was of no avail when it came to being at peace with oneself. That is when the idea of Honey Bee came to mind.

Honey Bee is a metaphor indicating ethical as well as professional values which most of us seldom profess or practice. A honeybee does two things which we, intellectuals often do not do: (i) it collects pollen from the flowers and flowers do not complain, and (ii) it connects flower to flower through pollination, apart from making honey of course. When we collect knowledge of farmers or indigenous people, I am not sure whether they do not complain. Similarly, by communicating only in English or French, or a similar global language, there is no way we can enable people to people communication. In the Honey Bee network, we have decided to correct both the biases. We always acknowledge their innovations by their name and address and ensure a fair and reasonable share of benefits arising out of the knowledge or value addition in the same. Similarly, we also have insisted that this knowledge be shared in local languages so that people to people communication and learning can take place. Global trade so far has not created enough space for such knowledge to be exchanged among people in different continents which reduces their transaction costs of learning from each other around particularly non-monetary green technological innovations.

Honey Bee, in that sense, is like a Knowledge Centre/Network, which pools the solutions developed by people across the world in different sectors and links, not just the people, but also the formal and informal science. It is obvious that people cannot find solutions for all problems. At the same time, the solutions they find need not always be optimal. There remains a scope for value addition and improvement in efficiency and effectiveness. But it is definite that a strategy of development, which does not build upon on what people know, and excel in, cannot be ethically very sound and professionally very accountable or efficient.

Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI) has set up an internal fund to honor ten to fifteen innovators every year from its own resources supplemented by the license fee received from a company to whom three herbal veterinary drugs were transferred based on public domain traditional knowledge. Similarly patents have been filed or are being filed on behalf of several innovators. In the case of Tilting bullock cart developed by Amrut Bhai of Pikhore village, while the patent is pending, the technology has been licensed to private entrepreneurs for three districts of Gujarat for an attractive financial consideration. This amount has been given to the Amrut Bhai through Gujarat Grassroots Innovation Augmentation Network (GIAN). GIAN itself was set up in 1997 as a follow up to the International Conference on Creativity and Innovation at Grassroots, held at IIMA in collaboration with Gujarat Government to scale up and commercialize grassroots innovations. The golden triangle linking innovation, investment and enterprise, which I first talked about at the AIPPI forum, organized three years ago has now been operationalised. SRISTI had pursued this linkage through its venture promotion fund before GIAN came into being. Even after that, it continues to provide financial support for action research to small innovators. Whether global linkages among innovators in one country with investment and enterprise in second and third country take place, is only a matter

of time.

Four case studies bring out various issues:

- A) To what extent has been the generation of awareness about rights of traditional communities and grassroots innovators among various stakeholders effective in changing the way business is done? It seems that professionals like scientists and academics have been far more proactive than the corporations in this regard (Shaman pharmaceutical and Dr. Nair's Technology Foundation are two of the few exceptional companies, most mainstream companies have so far shied away from making any bold attempt to tilt the scales in favor of local communities).
- B) Whether the norms of benefit sharing have acquired the status of a professional value. For instance before accepting a PhD thesis, a certificate is generally taken from the student that he/she has acknowledged all the contributions in the research work. However, a similar declaration is not insisted upon from the researchers and commercial users of indigenous knowledge that they have made due acknowledgement and reciprocal arrangement with the innovators. The norm of acknowledgement of local knowledge has not become professional value among germplasm collectors as well as ethnobiologists.
- C) What combination of monitoring and non-monitoring incentive would be optimal for which kind of knowledge systems and innovations and under what institutional arrangements? Unless such a contingent framework is developed, it is unlikely that most users of biodiversity will be able to initiate benefit-sharing experiments.
- D) We do not know as to what level of intellectual property protection will make the local knowledge system vibrant and buoyant. Is it possible that fears about the erosion of local knowledge increasing due to its valorization are unfounded?
- E) What are the reasons, which explain such a dearth of information on experiments around benefit sharing? Why are so few people trying to pursue these experiments? Why aren't consumers of value-added products in Europe and other western countries as conscious of the rights of local communities and grassroots innovators as they are about the rights of the animals?
- F) What is preventing the NGOs and Government in third world countries from initiating benefit-sharing measures on their own among the various institutions within the country? Why should intra country arrangements of benefit sharing as attempted by TBGRI and Honey Bee Network not take place in many countries and await the resolution of North South conflicts?
- G) Not in one case, the consumers of herbal and other products have demanded fairer contracts with the local community in contrasts to the boycott of beef burgers in the US some time ago to discourage environment unfriendly rearing of beef in Latin America.
- H) What is the perception of local communities and innovators themselves on the issues of benefit sharing?

The context in which local knowledge evolves and gets modified or transformed overtime is discussed in the next part.

## II. ALTERNATIVES TO DEVELOPMENT: FROM GRASSROOTS TO GLOBAL

SRISTI, a global NGO set up few years ago, provides organizational support to the Honey Bee network around the world. It is a network of odd balls who experiment and do things differently. Many of them end up solving the problem in a very creative and innovative manner. But the unusual thing about these innovations is that they remain localized sometimes unknown to other farmers in the same village. Lack of diffusion cannot be considered a reflection on the validity of these innovations. The innovations could be technological, socio-cultural, institutional and educational in nature contributing to the conservation of local resources and generation of additional income or reduction or prevention of possible losses. Farmers have developed unique solutions for controlling pests or diseases in crops and livestock, conserving soil and water, improving farm implements, various kinds of bullock or camel carts for performing farm operations, storing grains, conserving land races and local breeds of livestock, conserving aquatic and terrestrial biodiversity, etc.

Honey Bee has already collected more than eight thousand innovative practices predominantly from dry regions to prove that disadvantaged people may lack financial and economic resources, but are very rich in knowledge resource. That is the reason we consider the term 'resource poor farmer' as one of the most inappropriate and demeaning contributions from the West. If knowledge is a resource and if some people are rich in this knowledge, *why should they be called resource poor* (a term used in GATT/WTO also)? At the same time, we realize that the market may not be pricing peoples' knowledge properly today. It should be remembered that out of 114 plant derived drugs, more than 70 per cent are used for the same purpose for which the native people discovered their use (Farnsworth, 1981). This proves that basic research, linking a material and effect, had been done successfully by the people in majority of the cases. Modern science and technology could supplement the efforts of the people, improve the efficiency of the extraction of the active ingredient, find causal mechanism, or synthesize analog of the same, thereby improving effectiveness.

The scope for linking scientific search by the scientists and the farmers is enormous. We are beginning to realize that the peoples' knowledge system need not always be considered informal just because the rules of the formal system fail to explain innovations in another system. The soil classification system developed by the people is far more complex and comprehensive than the USDA classification systems. Likewise, the hazards of pesticides residues and associated adverse effects on the human as well as entire ecological system are well known. Some of these practices could extend the frontiers of science. For instance, some farmers cut thirty to forty days old sorghum plants or *Calotropis* plants and put these in the irrigation channel so as to control or minimize termite attack in light dry soils. Perhaps hydrocyanide present in sorghum and similar other toxic elements in *Calotropis* contributed towards this effect. There are a large number of other plants of pesticidal importance found in arid and semi arid regions, hill areas and flood prone regions which can provide sustainable alternatives to highly toxic chemical pesticides.

It is possible that private corporations may not have much interest in the development and diffusion of such alternatives, which pass control of knowledge into the hands of people. However, an informed, educated and experimenting client always spurs better market innovations as is evident from the experience of computer industry. Therefore, we do not see a basic contradiction between the knowledge systems of people and the evolution of market rules to strengthen and build upon it. However, such a model of market would be highly decentralized, competitive, open and participative.



Honeybee in that sense is an effort to mould markets of ideas and innovations but in favor of sustainable development of high-risk environments. The key objectives of SRISTI thus are to strengthen the capacity of grassroots level innovators and inventors engaged in conserving biodiversity to: (a) protect their intellectual property rights, (b) experiment to add value to their knowledge, (c) evolve entrepreneurial ability to generate returns from this knowledge, and (d) enrich their cultural and institutional basis of dealing with nature.

Of course no long-term change in the field of sustainable natural resource management can be achieved if the local children do not develop values and a worldview, which is in line with the sustainable life style. Thus education programs and activities are essential to perpetuating reform.

Globalization in trade and investment through harmonization of national laws, particularly dealing with intellectual property rights is one of the major impacts of GATT/WTO. The contribution of knowledge as a factor of production is being increasingly given central importance in economic development. The management of knowledge not just in farms and firms but also in the non-farm sector will become very crucial in coming years. The intellectual property rights deal with the reciprocity in rights and responsibilities of inventors and society at large. In lieu of the disclosure of the patented innovation or invention, the society agrees to recognize the right of the inventor to exclude others not authorized, from commercial exploitation of the invention. It is a kind of social contract between society and the inventor. Society gains by getting access to the inventive process and product, which can be used by other inventors for making improvements as well as developing substantive new innovations. Inventor benefits by having incentive to invest himself/herself or assign it to some one else interested in commercial exploitation of the invention. If others could easily copy the invention as happens in process patents, then investors will not make major investments and inventors will have no incentive to disclose. The plants and animals were kept out of the purview of patents when the concept was developed initially. However, in the fifties, discussion started on finding out ways in which more plant varieties could be developed and breeders could be given incentives to innovate and disclose the improvements.

There are several ways in which indigenous knowledge, innovation and practices can be protected so that the informal knowledge system continues to grow and symbiotically link with modern science and technology:

- a) Overcoming informational asymmetries in the formal and informal knowledge systems through IT applications;
- b) Reforming IPR system to make them accessible for small grassroots innovators;
- c) Establishing dedicated green venture promotion funds and incubators for converting innovations into enterprises;
- d) Reforming the mandate and responsibility of CG institutions to make it obligatory for international agricultural and natural resource management institutions to accord priority to adding value to local innovations;
- e) Rethinking and redefining the role and responsibility of international financial institutions with respect to ethical, institutional and financial support for grassroots innovations and local knowledge systems.

III. MAKING IPR SYSTEM ACCESSIBLE TO SMALL INNOVATORS AND LOCAL COMMUNITIES: Key objections to stronger IPR regime along with a case for stronger IPR regime: (GUPTA, 1996<sup>5</sup>, 1999)

The debate on the relevance and appropriateness of the conventional IPR regime for Plant varieties, products based on knowledge of local communities and individual informal experts and use of local biodiversity even without use of associated knowledge systems has become very emotive in recent years. Many NGOs and activists see no merit in the IPRs regime for providing incentives to local communities and creative individuals. They term the attempts of the large corporations (generally MNCs) to access biodiversity without sharing any benefits with local communities as 'Biopiracy'. Many others oppose the IPRs because these are supposed to commodify knowledge which reportedly was 'always' in the common domain for universal/local benefit. High costs of hiring patent attorneys are supposed to make the present patent system out of reach of grassroots innovators. The absence of any institutional set up in most developing countries to (a) provide information about IPRs, (b) extend help to obtain patents for individuals or communities and (c) oppose the patents by others on the knowledge traditionally known to local communities, have further alienated the moderates and hardened the attitudes of the conventional opponents.

The arguments of those who do not see any hope in the provisions of TRIPS can be summarized as:

- a) All the knowledge held by people about use of biodiversity for treating various ailments of human and animals, producing vegetative dyes, developing local land races etc., is held in common by the local communities. This knowledge is supposed to have been transferred by one generation to another over very long period of time with (or without) some value addition by successive generations;
- b) The knowledge must be held in common domain and should not be allowed to be monopolized by MNCs (though the behavior of the public sector and private but national drug companies is no different from the MNCs);
- c) Intellectual property right regime evolved for protecting industrial designs and processes and is not suitable for biological processes and products;
- d) Since the knowledge of various plants has been developed over several generations, why should present generation be entitled to reap all the rewards if any?
- e) Why should governments be entitled to any benefits from the commercialization of patented products when the resource and the knowledge were actually provided by individuals or communities?
- f) While process patents can be provided, the product patents impede research, generate excessive monopoly to one or few inventors, make the technology or products out of reach of common people due to price increase, and discourage expertise of successful reverse engineering in third world.

There are many other arguments on ethical and efficiency grounds against the patenting of life forms and also against the products derived from common knowledge without any

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<sup>5</sup> Based on Gupta, Anil K, 1996, Rewarding Creativity For Conserving Diversity In Third World: Can IPR Regime Serve The Needs Of Contemporary And Traditional Knowledge Experts and Communities in Third World? a Paper presented in AIPPI Forum (September 10-14, 1996) on Ethical and Ecological Aspects of IPRs, Interlaken, Switzerland, on September 13, 1996 since published in Cottier et al, 1999.

reciprocity towards knowledge generators or providers in one or more countries in the region.

I propose to dispel many of these myths, acknowledge where there is a genuine case for reforms of patent regime and finally suggest an alternative framework, which may be needed to help achieve the goals of IPRs i.e. rewarding inventive and creative activities in society. It is acknowledged that encouragement to creative and innovative spirit at grassroots level will not be possible only through IPR regimes. It is for this reason, SRISTI and Honey Bee network have been arguing since 1989 that various models of reward involving material and non material incentives for individual and communities applicable in short and long term should be explored. One of the material- Individual way of rewarding creativity can be patenting and other such forms of protection of intellectual property (Gupta, 1989, 1990, 1991,1995, Honey Bee 1989-95). But this is just one way.

#### My Case:

- a) Not all the knowledge held by people in biodiversity rich economically poor regions and communities is (a) traditional, (b) carried forward in fossilized form from one generation to another but has been improvised by successive generations, (c) collective in nature, and (d) even if known to communities, is reproduced by everybody.
- b) Considerable knowledge of economic importance is produced, reproduced, and improvised by individuals and also in recent times i.e. through contemporary innovations.
- c) Even the traditional knowledge should receive certain kind of protection if incentives have to be generated to conserve not only the knowledge but also the institutions of its reproduction and inter-generational transfer. We should not kill the goose, which laid the golden eggs so long.
- d) Given the high hit rate in formal research around locally identified uses of plants and other kinds of biodiversity, transaction costs of formal R and D systems in private and public systems are reduced considerably. They should in turn share the benefits that may accrue from commercialization of so protected products. In some cases local communities or individuals as the case may be should be considered co-inventors of the new value added products.

We have made this unpopular argument for last several years through the columns of Honey Bee newsletter and otherwise, that southern governments should not discriminate among national and international companies/organizations regarding (a) threat to environment from unrestrained exploitation of germplasm or biodiversity without replacing or repairing disturbance to natural habitats, (b) exploitation of local or traditional or contemporary knowledge of people without prior informed consent, and ensuring equitable sharing of benefits, and (c) contribution to national capacity building in negotiating fair and reasonable contracts among people and the biodiversity prospectors. What solace does it give to the poor biodiversity conserving community that in some cases it is exploited by national companies and not a MNC? Some exceptions may be made in case of those NGOs or civil society organizations which are explicitly accountable to people and are experimenting to evolve models of rewarding creativity through material and non-material incentives for individuals and communities.

- e) The newness and non-obviousness of a traditional knowledge should be seen in the light of available repertoire for that particular purpose.

- f) The local knowledge should qualify to be considered new for the purposes of prior art since outside communities/companies may not have had access otherwise. The norms regarding exhaustion of the rights due to publication of local knowledge should be reconsidered and modified so that incentives to share the knowledge by local communities with outsiders are not affected adversely.
- g) The argument that all the knowledge should be treated as common property is not tenable because large number of local experts we have met so far are extremely knowledgeable though very poor. They know far more than any body else in the village and have expertise to prepare various solutions. Others may know about it but they may not have contributed to it except by giving an opportunity for testing. To that extent they should have a small share in the entitlements. But the entitlements of an expert could not be at par with the rest of the community. Local communities have not provided them any significant incentives such that either their children or other younger people try to learn their skills.

It should also be noted that secrecy is not a gift of modern patent regime. Lots of traditional knowledge have already been lost or are in the process of being lost because the expert concerned did not ever share the innovation with any one.

- h) Every patent office in a western country should insist that patent applicant declares that the knowledge and resources used in a patent have been obtained law fully and rightfully.

This implies need for regulations in developed countries requiring full disclosure by any corporation or an individual seeking patent protection on a plant based drug or any other natural product. The disclosure should provide that the source material has been *rightfully* and *lawfully* acquired. 'Rightful' acquisition would involve moral as well as ethical issues in access to biodiversity. For instance even if a local community has not asked for any price for sharing the material or the knowledge about it, is the corporation bound by an ethical conduct to set up trust funds and other forms of reciprocity for local communities? Is it incumbent upon it to ensure that the superior ethics of local communities remaining poor despite conserving biological diversity and the knowledge around it does not become a reason for perpetuating their poverty, and thus endangering the survival of diversity itself?

The 'lawful' acquisition will imply that prior informed consent and approval and involvement of local communities and creative individuals has been ensured provided that the biodiversity donor country has laws requiring such a consent and approval. If a country does not have any such laws, as for instance India, then acquiring any material will be lawful or legal but may not be rightful<sup>6</sup>.

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<sup>6</sup> This argument has arisen in the context of Art 15.5 as well as Art 8j and 10c of Convention on Biological Diversity CBD. The prior informed consent is required only of parties to convention, i.e. the contracting nation states and not of the knowledge and resource providing communities. Under Art 8j however, the approval and involvement of local communities and Individuals is required for ensuring equitable sharing of the benefits. Whether, that happens will of course depend upon the legislative environment and local institutional capacity in each country. The institutions which deprived knowledge rich -economically poor people of their basic rights and needs would let any benefits trickle down to them will depend upon access of such people to alternative frameworks of negotiation and mutually agreeable contracts.

#### IV. REFORMING IPR SYSTEMS

*Publication of Indigenous knowledge, innovations and practices and exhaustion of Intellectual property rights: The case for international and national registration system*

In a recent paper<sup>7</sup>, I recognized that the publication of local knowledge exhausts IPRs on one hand and may deprive the knowledge provider any benefit that may arise from value addition in local knowledge to the individual or community or nation concerned. At the same time, local language publications make it possible for people struggling with similar problem to learn from it. This happens through publication in local languages as attempted by Honey Bee. However, the challenge is to marry two goals of easy and quick opportunity for lateral learning (through local language publication) and sharing of benefits through value addition in the same knowledge. A quick legitimacy to Data Bases like Honey Bee and registration system<sup>8</sup> of innovations may provide the answer. Honey Bee will then make its databases accessible to all patent offices in lieu of the protection provided to the communities and individuals whose knowledge is catalogued in it. The alternative of greater secrecy and withholding of knowledge will make every one loser through a) greater erosion of oral knowledge, b) continued unwillingness of younger generation to learn the knowledge, innovations and practices developed over a long period of time, c) depriving any opportunity to knowledge holders as well as those dependent upon them to improve their livelihood prospects through sharing of possible benefits, d) lack of material incentives for conservation of endangered species, e) knowledge rich poor communities may migrate out due to low opportunities for subsistence and employment and not take care of local resource or over exploit the resource itself netting very little value in a short period of time, and f) stifling the very creative and buoyant laboratory of innovations at grassroots by denying any social esteem for such knowledge through material as well as nonmaterial incentives and general neglect.

Since it will be very difficult for any and every community to seek protection of its knowledge and inventive recipes for various purposes such as herbal pesticides, human or veterinary medicines, vegetative dyes, etc., a registration system should be developed. Such a registry will prevent any firm or individual to seek patent on community knowledge as well as on knowledge and innovations produced by individuals without some kind of cross licensing. A proposal for International Network for Sustainable Technologies, Application and Registration (INSTAR) has been mooted by SRISTI during last six years. The basic structure of INSTAR is as follows.

It will be possible to achieve the following results from such a registry:

Primary entitlements:

- i) Acknowledgement of individual and collective creativity.

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<sup>7</sup> Anil, K Gupta, 1996, Rewarding Creativity for Conserving Diversity in third world: Can IPR Regime Serve the Needs of Contemporary and Traditional Knowledge Experts and Communities in Third World?, Presented at AIPI forum, Interlaken, Sept, 1996.

<sup>8</sup> Such a registry will prevent any firm or individual to seek patent on community knowledge as well as on knowledge and innovations produced by individuals without some kind of cross licensing.

- ii) Grant entitlements to grassroots innovators for receiving a share of any returns that may arise from commercial applications of their knowledge, innovations or practices with or without value addition.

Secondary Entitlements:

- iii) Linking the golden triangle of entrepreneurship by linking Investments, enterprise and innovations. Small-scale investors in North and South can not afford to go to various countries, scan diversity of knowledge and resources, negotiate contracts and invest up front huge investments for value addition. If they do not participate, then the field will remain dominated by only large corporations. This register will help small-scale investors seek opportunities of communication with communities and individual innovators and explore opportunities of investment. Large number of potential negotiations will take place increasing the opportunities for innovative communities and individuals. The competition among the investors tempered by competition among potential suppliers of a various kinds of knowledge as well as diversity will moderate expectations on both the sides.
- (iv) An autonomous authority of which local community representatives will be the majority members could be entrusted with the responsibilities of having access to all the contracts. A copy of the contracts may have to be deposited with this Authority so as to avoid short changing of the communities. These contracts will also be scrutinized to see whether management plans for sustainable extraction of diversity have been drawn upon scientifically appropriate manner or not. Penalties may have to be imposed for non-sustainable extraction of herbs by domestic as well as external extractors.
- (v) Each entry in the Register will be coded according to a universal system like ISBN. The postal pin code of the habitat of the community or individuals registering innovations will be incorporated in the indexation system so that geo-referencing of innovations can be done. In due course the contextual information of innovations can also be incorporated in the system so that this systems of innovations can help cross connect the communities having similar ecological situations or facing similar constraints or challenges around the world.
- (vi) The entry in the register will in the first stage be mere acknowledgement of creativity and innovation at grassroots level. But later some of the innovations will be considered appropriate for award of inventors certificate or a kind of innovation patent which is a limited purpose and limited duration protection. Essential purpose of this innovation also is to enable the potential investors (a cooperative of consumers, producers, an entrepreneur, or a large firm in private or public sector) to link with the innovator and set up an enterprise.
- (vii) The award of certificate will also increase entitlement of innovator/s for access to concessional credit and risk cover so that transition from collector, or producer of herbs to developer and marketer of value added products can take place in cases where innovators deem that fit.
- (viii) The registration system will also be part of Knowledge Network linking problem solving people across the world at grassroots level (see discussion on Knowledge network in the later section). This will promote people to people learning and

serve as a multi-language, multi level, multi media (oral, textual, electronic) clearing house for local and indigenous communities. Wherever necessary and possible, formal scientific institutions will be linked up in the network. Apart from the registration system a large number of specific incentives would need to be developed for different categories of knowledge, innovations and practices. Similarly the incentives for preservation of sustainable lifestyles of indigenous communities would also be different.

Knowledge Network for sustainable technological options operationalised through Honey Bee network approach implies that innovations in one part of the world, may seek or attract investments from another part, if necessary, to generate enterprises (whether commercial or non commercial, individual or co-operative) in third place. Several innovative experiments have been started to explore this Golden Triangle for rewarding Creativity. It requires acknowledging that not all innovators may have the potential for becoming entrepreneurs or have access to investible capital. One could have an innovation say from India, investor from Europe and enterprise in South Africa. Forces of globalization could after all be also mobilized in defense of poor creative people.

Information Technologies like any other technology can help bridge as well as widen the gaps between have and have-nots. What is very encouraging about the new possibilities that IT trends offer is the scope for democratizing knowledge, which was never so high as now.

Other reforms in IPR system:

1. Search for prior art and essential disclosure by the applicants: It has been felt for a long time that patent offices issue improper patents because they do not have either access, time, perspective or sometimes even willingness to explore information in databases not available on internet or in electronic format. Recently, CIEFL has submitted a presentation to USPTO suggesting modifications in the procedures for searching prior art. SRISTI has also been pleading for last several years that databases of community as well as grassroots knowledge should be accessed by the patent offices to avoid issuance of trivial or improper patents. Specific steps required in the matter are:
  - a) Various NGOs and other documentation services should be contracted by WIPO or leading patent offices to convert published data on ethnobiology, indigenous knowledge and other innovations into electronic databases so that each patent office can screen these before issuing any patent. The cost of building up of these databases will have to be raised from multi lateral sources. In some cases, it would also include translation from local languages.
  - b) There should be incentives for groups documenting local knowledge to share it with patent offices regularly.
  - c) Every applicant should be required to disclose that material, information or any other knowledge used in the patent application has been obtained lawfully and rightfully.
  - d) Those patent offices which do not disclose the patent applications before granting the patent should be obliged to make the applications public after reasonable period of time of application so that objections can be filed by the interested groups.

- e) There is a tremendous amount of knowledge, which is available only in oral form and has not yet been documented. There have been cases when such knowledge communicated in good faith by local people has been used without acknowledgement or reciprocity to claim intellectual property on the same. There should be severe penalty for such attempts so that these act as a deterrent. At the same time, mechanisms should be put in place for worldwide campaign for documentation and registration of these knowledge systems.
  - f) Just as a discussion is going on in the US on linking the application cost of patents with number of claims, there should similarly be, incentives for disclosing extensive prior art. This will encourage applicants to make extra efforts to disclose as much as prior art as possible and accordingly get concessions in the cost of application. This is particularly applicable for patent applications on biodiversity based knowledge and resources.
  - g) Not every localized knowledge, which is not yet documented, should be considered public domain unless it is easily accessible. Therefore, oral traditional knowledge in which some improvements may have been made should be eligible for being considered patentable. This will help the communities to decide whether they would like their knowledge to be public domain and thus become part of prior art or would like it to come in public domain after getting protection for a given period of time.
- B. Global dialogue on new systems of IPR for protecting localized traditional knowledge vis-à-vis the protection for traditional life styles embodied in geographically indicated products like wine.
- a) The conventional IPR system will exhaust the rights of local communities and traditional healers after 10-20 years depending upon the system in vogue in different countries. There is a need for experimenting with different kinds of protection for different kinds of traditional knowledge. Some can be protected through trade mark route, some by geographical indications, and still others through a combination of patent and inventors' certificate entitling the communities for sharing benefit for at least two generations i.e. 50 years. It is obvious that a small share provided regularly over a long term period gives greater certainty than a larger share given only once or for few years. The communities must be enabled to evolve institutions for utilizing external resources in a sustainable manner without becoming victim of non-sustainable life styles and consumption patterns as happened in the case of many of the north American native Indian communities.
  - b) The new systems of protection will have to balance the long-term need for the community to have interest in conserving the knowledge system and the incentives for those who add value to share the benefits for a limited period of time. Longer the period of the protection, the more delayed access will be there for those smaller firms which want to add value, reduce cost and make products available for larger consumption. Therefore the new system we propose should discriminate between rights of communities in the knowledge systems *per se vis-à-vis* the rights in a specific knowledge output. The rights in the systems should be perpetual. For instance, the classical health systems such as ayurvedic, unani or sidhdha have recipes, which are being granted patents in a rather indiscrete manner. This is improper. However, modifications in these recipes should be permissible for patenting with the understanding that a share of the benefit will go



into a global pool of funds for augmenting indigenous systems of medicines all over the world. This is similar to a system for plant varieties in which improved varieties based on land races should contribute a share to the global fund for *in-situ* conservation. Since every such benefit is shared ultimately at the consumer's costs, it is only natural that consumers should pay for the conservation of diversity.

- c) In the famous dispute on sheep meat export by England to France on which France had levied a tariff, it was reportedly resolved by the European court that France was justified in levying tariff on the import because (i) the shepherds in France were small scale herders and (ii) sheep rearing was a way of life for them without many alternative employment opportunities. In contrast in England the sheep rearing was a large-scale activity. In France the sheep rearing was dominating in a marginal environment with relatively speaking lower income levels. Therefore while negotiating tariff reduction, a special provision should be made in the next round on providing safety measures for such commodities, which are produced in the importing countries by poor people in marginal environment. For instance if the wools are imported from Australia and New Zealand into India, they depress the price of wool. Once the price goes down, the incentive for shepherds (primarily located in arid poor environment) to substitute low productive sheep by high cost high productive sheep goes down. The result is increase in the herd size and consequent increase in grazing pressure. The degradation of the environment is a direct consequence of low tariff on the imported wools. For the shepherd community, in arid environment, there are very few alternatives.
- d) Before granting any patent, patent office should demand declaration that the data or material used in the patent application has been obtained lawfully i.e. in fulfillment of the laws of the country from where these have been obtained, and rightfully i.e. through prior informed consent of the local community and the appropriate authorities.
- C. Developing low transaction cost system for small innovators

In addition to the model of INSTAR, we need experiment with another model based on Australian Innovation patent system. In Australia it was realized that most of the jobs are created by small firms a fact which is evident in most of the countries of the world and yet it was very difficult for smaller firms to license the standard patents which are much more costlier. The petty patent system did not serve the purpose because the inventive threshold was similar to one required in the standard patent system. Therefore it was proposed to setup an innovation patent system in which the innovations having lower inventive threshold will qualify for a protection for eight years with maximum number of five claims. The prior art requirement would be same as in the standard patent and formality examination would also be undertaken on all applications though substantive examination only on the request by the applicant or third party. The publication of the innovation patent application would occur three months after filing. Dual protection by standard and innovation patent would be possible (Review of the Petty Patent System, Advisory council of industrial property, AIPO Canberra, 1995). Conventionally the fees for the Petty Patent and the Standard Patent were more or less same and the time taken in the Petty Patent was lesser. On an average 300 Petty Patent applications were filed with 50 to 60% granted patent. The foreign applicants had rarely used it. Individuals rather than

companies made the majority of the Petty Patent applications. In comparison, Australia received 20000 applications for standard patents out of which only 10% made by Australians. As against this, only 1.5% was the share of Petty Patent. The share of agriculture or veterinary was just about 5% in petty patent.

The distinction that one needs to make from the conventional utility models relates to the subject of protection. The utility models were intended to cover designs and other incremental improvements but not necessarily a kind of product patent for drugs, or agriculture. Although interpretation vary from country to country. What is recommended here would be further improvement on the Australian innovation system so as to include the term of at least 10 years, claims 5-7, lower inventive threshold but availability of a product and use patent. Thus an indigenous herbal drug developed by a local healer can receive product patent for 10 years. During this period, potential manufacturers may get in touch with the inventor and may negotiate the right so as to file a standard patent if large-scale manufacture was considered desirable and profitable. The fees should be negligible but publication of application within a year should be obligatory and the granting of patent should not take more than a year or 18 months.

The cost of filing patents can be very high. For example, a US patent application in 90s could be about 20,000 USD, while in the EU could cost twice that amount. However, this cost varies a great deal and in thirty-two countries it was found to vary from USD 355 to 4772 in 1990s (Helfgott, 1993). John Borton of Stanford Law School has argued that the concentration of market power in larger corporations in seed industry has been a dominant trend. This is something that is not conducive to generation and development of diversity in agriculture. On the other hand, the smaller start up biotech companies are able to recover their costs and make money when taken over by larger corporations (Tansey, 1999). The issue is whether the corporation, which takes over these small firms, does so to promote the new technologies or to block them lest they pose competition to the existing technologies of large firms.

The global registry can incorporate the information on these patents as well. In addition the plant variety registered should also be catalogued.

#### D. Improvements in the Plant Varieties Registration and Protection System

The Article 27-3 b is likely to be negotiated hard at the forthcoming review. There are several issues which arise in that context which are mentioned below:

The article 27.3(b) of TRIPS agreement is a subject of intense debate. There are many groups particularly, of the indigenous people from Latin America (July 25<sup>th</sup>, 1999) who have strongly opposed the provision for patent on life forms in this article. The key arguments against this article are (a) patent on plants and animals or essentially biological process for the production of plant and animals are in contradiction with the conception of life being sacred and beyond human interference in its basic characteristics. The patents on gene sequences give protection to those who did not invent these sequences but merely discovered these. Patents on microorganisms likewise, reward discovery, isolation, characterization to an organism unaltered in its basic genetic make up from the

one found in nature. The essentially biological process such as gene sequences or other biotechnological methods interfere with public morality or ethics.

On the other hand, the arguments which support incorporation of article 27.3(b) in the national laws particularly regarding agriculture imply, (a) recognition that incentives will need to be created for public, private, NGO and individual plant breeders for investment in breeding activities for which protection from unauthorized multiplication and marketing must be available; (b) the potential of transgenic in reducing pesticide consumption and thereby improving productivity, enhancing uptake of vitamin 'A' and iron (as attempted by some Swiss biotechnological scientists recently in rice varieties) and other minerals to help overcome anemia from which more than 1.2 billion disadvantaged women in rice growing and consuming areas suffer; (c) protection from micro organisms that can help in (i) better realization of nutrients that are not available through the plants for one reason or the other, (ii) developing new antibiotics, (iii) monitoring soil eco system health, (iv) restore productivity of degraded soils naturally or through human actions, and (v) developing plant protection technologies; (d) using DNA fragments to screen germplasm or animal breeds for specific ailments, genetic deficiencies or potential.

Basically, the debate is on using the potential of biotechnology to achieve newer production frontiers versus relying on conventional approaches of plant breeding and animal breeding to improve productivity. The risks are involved in conventional as well as modern technologies. Lot of weeds and pests were transported from one part of the world to another in the last few decades. One did not argue for stoppage of trade in food materials. Instead, the argument was for stronger and more effective phytosanitary standards. Likewise, the response to biotechnological technology development and transfer should be through better and more effective bio-safety guidelines, competence and enforcement through involvement of civil society in as wide a manner as possible. The ethical issues must be handled up front through bio-ethics committees and watchdogs at different levels through transparent systems of accountability. A society can then decide whether adverse toxic effects of chemical pesticides on the health of farm workers, consumers, environment have to be preferred over the potential hazards that may take place through transgenic crops or animal breeds. The ethics of continued tolerance of harm to poorest people, i.e., farm workers *vis-à-vis* potential harm to environment must be evaluated dispassionately. I am always in favor of precautionary principle, i.e., when in doubt, err on the side of caution or safety. However, we should distinguish the problems of 'risk' from that of 'uncertainty'-in the first case, we can estimate probability of occurrence while in the latter case we can not.

At the time of review of this Article 27.3b in November 1999, the developed countries are likely to push for not only using UPOV as the effective *sui generis* system but replace the option of *sui-generis* system by UPOV 1991. This is the position that pharmaceutical and agro business industry in the west favors. The EU may favor UPOV-PVP option but there is a difference of opinion within the EU on desirability of patents on plants and animals.

So far as developing countries are concerned, the opinion is likely to be quite divided. Most NGOs and farmers organizations prefer to keep plants and animals out of the patent and also do not favor increasing control of corporations on the seed industry. Some countries, which export agricultural products, may prefer a stronger protection regime. It is likely that plant variety protection coupled with farmer's rights and gene fund as being attempted in India will help in influencing public opinion much better. An issue that has not received enough attention in this debate relates to the ability of various country governments in generating revenue for sharing benefits, conserving agro biodiversity *in-situ* and for investment in R&D.

## V. HIGHLIGHTS OF INDIAN PLANT VARIETY AND FARMERS' RIGHT BILL, 1999

Indian Government is yet to enact a plant variety act but the draft has already gone through vetting by inter-ministerial group and represents one of the most progressive documents. There are many features in this draft bill which none of the 39 country plant variety acts had.

- a) The Indian government has preferred to use *sui generis* system instead of patents because of three major advantages: a) flexibility, b) better protection of farmers' rights, and c) stronger researchers' exemption.
- b) The Indian Draft Bill on Plant Variety and Farmers' Rights provides for the option of compulsory licensing when reasonable quantity of seed or reproductive material of protected variety is not made available in the country.
- c) Government has the power to determine which genera and species would be covered under the Plant Variety Protection.
- d) In case of any disputes regarding orders of Indian PVFRB Authority, the high courts will have the jurisdiction for resolving any complaints.
- e) Clause 25 of the Bill has a provision for non-registration of the varieties, which are injurious to the public morality or health as in the case of 'terminator gene'.
- f) There is a provision of setting up gene fund, which will determine the share of benefits to be given to farmers or other breeders and also decide the eligibility for getting benefits, whether benefits are given one time or on recurrent basis.
- g) There is a provision for registration of extant varieties, i.e. the ones notified under Seed Act, 1966 released by the Central Seed Committee. The provision also exists for preservation jointly or severally of wild species or a traditional variety with or without added value and which has economic use.
- h) The farmers' rights include the right to (i) produce his crop, (ii) use product of crop as seeds for producing further crop, (iii) sell product of crop except its sale exposing it as a seed.
- i) The new varieties are supposed to be those varieties, which have not been grown earlier than one year outside India and in case of trees and vines not earlier than six years. In all other cases, the limit is four years.
- j) The distinctiveness of the variety is defined by its distinguishability by at least one essential characteristic from any other variety whose existence is a matter of common knowledge in any country at the time of filing of application. Failure of an application for the grant of breeders right to a new variety or its derivatives shall deemed to render that variety as a matter of common knowledge.

- k) The applicant is required to provide complete passport data of the parent line from which new variety or its propagating material has been developed.
- l) The duration of protection is 18 years for trees and vines and 15 years in the case of extant varieties and 15 years for other crops except extant varieties in which 15 years will be calculated from the date of notification by the government under the Seed Act, 1966 or from the date of release or date of registration as a farmers' variety whichever is earlier.
- m) Gene Fund: Breeder will deposit in gene fund the amount determined by the authority. In case of default, this amount can be recovered as an arrear of land revenue.
- n) The breeder will be required to deposit appropriate quantity of the propagating material.
- o) Researchers Right: Authorization of breeder or plant variety protection holder is necessary when repeated use of parental lines of a variety is required. Otherwise nothing will prevent any researcher from using a protected variety as a research material.
- p) Farmers right: Farmers have the right to save, use, exchange, share or sell their farm produce of a protected variety except when covered by contractual market arrangement.
- q) Rights of communities: People of any community or an NGO representing them can represent the contribution of people to a variety granted protection under the Act. The authority would verify such claims. And if found valid, compensation would be paid to NGO/people who submit claims of people against which existing breeder/s enjoying protection would be heard and given notice. The compensation granted by the breeder will be deposited in the gene fund. The NGO or the community shall withdraw the compensation even if such a fund has not been deposited by the breeder concerned in the gene fund. The compensation shall be recovered from the breeder in case of default as an arrear of land revenue.
- r) National Gene Fund: The functions of national gene fund are, (i) benefits sharing in the prescribed manner, (ii) royalty paid at such rate as may be prescribed by the central government on the sale price of the seed or propagating material of a registered variety, (iii) contribution from national or international organizations can be received in the gene fund.
- s) All plants under the order Plantae are included for protection except microorganisms.

There are many progressive measures in Indian draft, which do not find mention. The ethical issues in the grant of patent rights on life forms are extremely contentious. The developed countries had not paid attention to the protection for inter-generational flow of knowledge and the rights of traditional communities over their resources and knowledge. Things are beginning to change. And some attempts have been made in Australia and Canada in this regard.

A question, which has not been addressed by the opponents of IPR regime, relates to the alternative organizational structures, which can pursue the goal of promoting inventions and generate protection for the same. Likewise, another less researched issue is the tradition of this protection provided in past to the creative people within traditional communities. On the first issue we should look at the role of cooperatives, small firm networks and other voluntary associations of inventors to produce new inventions. On the second issue, we should look at the practices followed by some of the healers, potters and other artisans and knowledge experts in various parts of the world to restrict copying of their designs, innovations or other

creations. This indicates that the idea of protecting innovations is not necessarily a new construction of the last five centuries.

The technology transfer and sustainable development are two of the important goals of WTO in the context of TRIPS, which have not received sufficient attention.

## VI. RECASTING PLANT VARIETY ACTS

- a) The definition of the variety should include discovered wild or other plants having distinctive and stable properties. France and China have the concept of discovered plant having DUS property as eligible for the protection. However, the problem with the uniformity requirement is that heterogeneous or buffering populations characteristic of marginal environment with high fluctuations may not get protection under DUS provisions. In the times to come the genetic uniformity is likely to become a major threat to food security. Therefore provisions for buffering population which are distinct and stable over a long period of time (5–10 years) may be created. The present system is designed primarily for commercial crops in irrigated regions.
- b) The right to save, exchange, sell the products of a protected variety must remain with the farmers. However, sale of the seed under the branded name has been discouraged. It is necessary that farmers' rights in this regard are respected. Only very large farmers having holding more than 100 hectares may be required to take license or pay royalty for commercializing protected variety of seeds.
- c) A national and international register of land races acknowledging community right should be established. Simultaneously recognition of the community rights in the extant varieties as proposed in the Indian draft bill should also be incorporated.
- d) The passport information sheet of the Gene bank should include the knowledge of community with particular focus on women knowledge. At present a very small proportion of the passport sheet identify the community, region or specific farmer for whom the material has been collected. Updating of passport sheet will be very necessary for operationalizing a benefit sharing system and therefore global efforts to create a fund for the purpose are urgently called for.
- e) The prior informed consent of the farmers must be obligatory in cases where on farm trials of transgenic crops are called for. In most developing countries farmers do not have an adequate information on the subject. Many times anxiety about transgenic is higher than the damage caused by conventional methods such as use of chemical pesticide. However, there is no legal agreement by which exports of pesticides, which are banned in the source country, can be prevented.
- f) Every applicant seeking plant variety protection must disclose that the germplasm, parent lines or other material used for developing new variety. The applicant should also prove that the material was taken through prior informed concern and after fulfilling a material transfer agreement (MTA). Besides other legal requirement in the country where protection has been sought.
- g) The quality standards should be so evolved that genuine product from developing country are not restricted because scientific evidence about the minimum standard has not been generated in the developing countries. The standards very often are based on the scientific evidence from temperate countries.

- h) The negotiations for an international registry of wines through international registers may be accepted only if similar registration facility for local varieties of crops and indigenous animal breeds as well as other products is accepted.
- i) Unlike International Union for Plant Variety Protection, there is no international agreement for protection of traditional animal breeds and associated knowledge system. There is a need to evolve institutional mechanism for protection of animal breeds also.

## VII. REFORMS AT CGIAR LEVEL

International negotiations must include a need for modifying the mandate of CG institutions so that these are obliged to acknowledge the local contributions in the development of land races, knowledge about uses of local varieties be included in the passport sheet as mentioned earlier and value addition in grassroots innovations be a necessary responsibility of these institutions. The global support for these institutions should be contingent on their accepting this condition.

It should also be obligatory on the part of each CG institutions to share the germplasm with private sector or others only through material transfer agreement (MTA). While a moratorium had been placed by the technical advisory committee (TAC) on patent on the land races by third parties, it is not sufficient. In fact we should encourage characterization and value addition in the land races and the protection of so improved or characterized land race but with the appropriate benefit sharing arrangements. The countries, which have provisions of patent as well as plant variety protection, must provide research exemptions and farmers' privileges.

Pedigree analysis of improved varieties should be undertaken regularly so that rights of communities contributing land races are acknowledged and reciprocated.

## VIII. REFORMS IN FINANCIAL INSTITUTIONS

No amount of registration or grant of patent will help make local knowledge system vibrant unless venture promotion grants are available to local entrepreneurs at very low transaction cost. While we have Grameen Banks or Saving and Credit Self help groups in different parts of the world, we do not have venture promotion fund for small innovations anywhere in the world. The result is the growth of entrepreneurial process is highly stilted. GIAN is an exception and it does not have as yet provisions for venture promotion grant from its own resources. Though it mobilizes funds for the innovators from Government programs for the purpose. Similarly most developing countries do not have incubators to convert innovations into product.

## SUMMING UP

Traditional Knowledge and Contemporary innovations can indeed benefit through globalization process because niche markets for many of the products may not exist up to a proper scale in one place, or demand from another part of the world may provide incentive for conservation and growth of knowledge, or needs in less developed parts of the world may be met through people's innovations from another part.

There could be several ways in which ICT, venture funds, global and national Registries and other innovations can expand the global space for local innovations and knowledge systems.

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