BIOLOGICAL DIVERSITY AND TRADITIONAL KNOWLEDGE **

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INTRODUCTION

India with a total geographical area of 329 million hectares is the second largest nation in Asia and seventh in the world. The great diversity of habitats owing to varied climates and altitudes endorsed India's rich and diverse flora. India is fortunately endowed with a wide range of agro-climatic conditions that support the growth of an equally diverse range of plant and animal species. But the loss of Biodiversity is a very serious problem of the country. Several species of the living organism are disapprearing and biodiversity is more threatened now than at any time in the past. It is generally believed that deforestation is the main cause behind the current crisis and along with this global climatic change, shifting cultivation, soil erosion, unchecked expansion of urban areas etc are the other main causes of this problem. The current rate of extinction demands immediate concerted efforts for conservation of biodiversity for future generations. Conservation f biodiversity could be accomplished using both *in situ* and *ex situ* methods.

It has been well recognized that valuable and productive biological resources are crucial for sustainable economic development. The rural populations always believes that biodiversity is important for their livelihood and survival. Protecting and conserving biodiversity is our own interest and industries such as pharmaceuticals, cosmetics, pulp and paper, construction, Agriculture and agro industries, Horticulture and waste treatment are dependent on biological resources. Between 70-80% of the population in developing countries relies on plants as the only source of medicine.

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HERITAGE AND TRADITIONAL KNOWLEDGE

Heritage is everything that defines our distinct identities of our people. This is bestowed on us by our ancestors and endowed to us by nature. It includes our social, political, cultural and economic systems and institutions as well as our belief systems, ethics and moral values and our customary laws and norms. Heritage includes traditional knowledge which is the creative production of human thought and craftsmanship, language, cultural expressions which are created, acquired and inspired such as songs, dances, stories, ceremonies, symbols and designs, pottery, artworks, scientific, agricultural, technical and ecological knowledge and skills required to implement this knowledge and technologies. Heritage also includes what we inherited from nature such as the natural features in our territories and landscapes, biodiversity which consists of plants and animals and microorganisms and the various diverse ecosystem which we have nurtured and sustained.

TRADITIONAL KNOWLEDGE AND COMMUNITIES

Biological resources and related traditional knowledge are often of great commercial value to business corporations in developing commercial products. Corporations often want to acquire IPRs related to biological resources and traditional knowledge as a way of maximizing their income generation.

Traditional communities is a broad term that refers to communities whose way of life is largely shaped by generations of their ancestors. They are distinct from urban or fast-changing societies and lifestyles, maintaining a shared body of cultural, environmental, economic and family customs that are based on traditional occupations, knowledge, values and social hierarchies. Traditional community livelihoods are usually based on natural resources. Traditional communities could include farming or fishing communities, forest-dwelling communities, indigenous people, nomadic communities, etc.

IMPORTANCE OF TRADITIONAL KNOWLEDGE

Traditional knowledge plays an important role in the conservation of biodiversity and its traditional uses:

- Indian Systems of Medicine (Ayurveda, Siddha, Unani) are part of the official healthcare system in India, and depend on a diversity of biological resources and traditional knowledge.

- Farmers and livestock keepers have improved and nurtured diverse varieties of crops and domesticated animals over generations. This has been invaluable for food security and in providing clothing, healthcare and shelter.

- All over India local communities have independently conserved wild areas, including natural ecosystems, sometimes deemed to be sacred e.g. ‘sacred groves’, some thousands of years old, dedicated to a local deity.

Traditional knowledge is therefore very valuable in a range of sectors. Industries have often freely used traditional knowledge for developing commercial products, usually without the consent of, or without acknowledging, the original holders of the knowledge. The conflict arises when such knowledge is commercially used without consent, or when IPRs and exclusive rights are claimed over such resources / knowledge.

CBD AND TRADITIONAL KNOWLEDGE

The convention on Biological Diversity (CBD) is the principal international instruments which explicitly acknowledges the role of traditional knowledge, innovations and practices of indigenous and local communities tangible and visible traditional life styles in biodiversity conservation and its sustainable development. The scope of the traditional knowledge covered by the convention, however, is confined to genetic

materials, It is a framework convention, setting out general principles that the parties agree to be guided by the work towards in a long term process.

According to Article 8(j) of the convention, each contracting party subject to its national legislation is required to respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities tangible or visible lifestyles relevant for conservation and sustainable use of Biological resources and promote the wider application of such knowledge, innovations and practices with the approval and involvement of their holders and also encourage the equitable sharing of benefits arising from the utilization of such knowledge, innovations and practices.

BIOPIRACY

Biopiracy is a violation of the rights of traditional communities over their biological resources and related knowledge. The implications of biopiracy are economic as well as ethical: Obtaining IPRs usually patents or Plant Breeders Rights to gain monopoly control over biological resources, related traditional knowledge, or commercial products based on these resources or knowledge, without the consent of, or any benefits going to, the original holders of the resources/knowledge.

The original holders of biological resources and related traditional knowledge do not get any share in the profits made from commercializing the products based on their resources/ knowledge. They also do not get any recognition for nurturing and developing the resources/knowledge in the first place. Once an IPR is acquired by the biopirate, the original holders of a biological resource or related traditional knowledge are barred from making any commercial use of the IPR-protected knowledge or resource. This could lead to a situation where, for example, a community is not allowed to sell an indigenous product that is covered by an IPR. The IPR-holder dictates the terms of use of the IPR-protected resource/knowledge, which could mean that traditional communities who are the original holder could lose access to, or control over, their resource/knowledge.

The investigation of biological resources for new commercial uses has been an inherent part of global economic and social development. The problem arises when bioprospecting leads to biopiracy or environmentally unsustainable practices such as collecting huge quantities of samples from an area.

The term ‘bioprospecting’ has acquired strong negative connotations and is often used in a sense that implies that bioprospecting necessarily leads to biopiracy. Some traditional communities may also find bioprospecting offensive because it seeks to commercially exploit biological resources and related traditional knowledge which are sacred, or which support their livelihoods.

TRADITIONAL COMMUNITIES AND VULNERABILITY TO BIOPIRACY

Traditional communities are especially vulnerable to biopiracy because Traditional communities do not consider their seed, crop and livestock varieties forest and marine resources and related knowledge as private property, but as communal property, God-given, or passed down by generations of their ancestors who have nurtured and developed the natural resources and related knowledge. For most traditional communities the concept of private ownership of a resource like a seed variety is completely alien, thus hindering a full appreciation of the threats and implications of an IPR regime. Traditional communities are vulnerable because of social hierarchies and low levels of awareness and literacy. There is an ignorance of the law and existing IPR-regime and even if the law is known, traditional community members are usually powerless to demand its enforcement to prevent biopiracy or get some form of benefit-sharing agreement, due to factors such as illiteracy, low social status and lack of financial resources. The norms and principles of international IPR regimes have developed in a way that has enhanced the vulnerability of traditional communities to biopiracy.

TRADITIONAL KNOWLEDGE AND AGRICULTURE:

Traditional knowledge transforms Biodiversity into Bioresources. Biodiversity and associated traditional knowledge are an integral strength of today's developing countries particularly in the areas of agriculture and Horticulture. It holds great potential all over the world that is increasingly being sensitized to Traditional knowledge. Indigenous men and women over generations have bred races of several food, cash crops and Horticultural crops out of wild plants of the forests called landraces or local or indigenous varieties and these are the basic foundations of modern plant breeding and global food security. Indigenous farming communities have also identified and managed a series of genes through selection and cross breeding. These genes have potential traits of pest(s) and disease(s) resistance, drought tolerance, high salt tolerance, cold tolerance, tolerance to waterlogging etc.

To develop a crop that can withstand global warming and climate changes across agricultural zones, International scientists visit tropical regions for crop varieties that are drought tolerant / resistance and for this purpose they depend largely on traditional knowledge and local farmers. Breeding and selection process with local varieties, they will be able to develop a potential and high yielding crop variety with combinations traits for tolerance to drought or salinity or resistance to pest(s) and desease(s).

TRADITIONAL KNOWLEDGE AND HEALTH CARE:

Traditional knowledge is a valuable system continuously developed over generations by tribal and rural communities in different parts of the world and transmitted from one generation to the next generation in oral form. The knowledge covers primarily on human and animal health besides the traditional knowledge pertains to building of houses, food and agriculture, textiles, handicrafts, soil conservation, moisture conservation and other natural resources management.

In India a well developed system using plants for health flourished in the vedic period around 3000 BC. Due to its strong cultural roots the Indian systems of medicine is still vibrarant and dynamic and central core for providing the health, security and livelihood needs of the bulk of India's people particularly the rural and tribal communities.

Accordingly to World Health Organization (WHO) estimated around 80% of the world's population have used indigenous systems of healthcare at one time or the other. In recent years herbal or alternative medicines based on Traditional Knowledge have gained acceptance across the world.

Indian systems of Medicine are the traditional systems of health care practiced in India for over several centuries and are still a viable living tradition of our people. **Ayurveda, Unani, Siddha, Yoga, Naturopathy** are the main traditional systems but it will not be surprising to find the roots of other alternative therapies like Aroma, music, photo, leech etc in traditional health care systems practiced in India.

INTERNATIONAL TRADE OF MEDICINAL PLANTS

- Annual International trade in Medicinal and aromatic plant material is 400,000 to valued at 1.1 to 1.3 billion US dollars in 1997. This figure is an increase of one third compared to 1995. Now this would have increased considerdly.
- China is the leading country with an export of botanical drugs aroung 140,000 t/year.
- India ranks second in export in terms of volume around 35,700 t/year but only in sixth position in terms of value of around 5,16,110,000 US dollars.

INTERNATIONAL MARKET FOR HERBAL MEDICINES

Annual global sales of medicinal products derived from the genetic resources is around 700 billion US dollars the global market for herbal medicine alone has reached 43

billion US dollars with an annual growth rate between 5 and 15%. It is expected to reach 5 trillion US dollars by 2002. China, the leader in the field generated an income of about 5 billion US dollars in 1999 from the International market and the global exports are around 10 billion US dollars which means China could snatch 50% global exports. Accordingly to WHO estimates, the European market in 1999 was calculated to be 11.9 billion US dollars in which Germany accounts for 38%, France for 21% and UK for 12%. The world wide Fund for Nature statistics have shown that the European Union imported over 100,000 tonnes of plant material in 1990, of which 12% were from India.

BIODIVERSITY AND BIOPROSPECTING

Bioprospecting is the exploration of biodiversity for commercially valuable biological and genetic resources. The term specifically refers to the investigation of biological resources for new commercial uses. A range of commercial sectors base their activities on bioprospecting, such as the pharmaceutical, biotechnology, seed and crop, horticulture, cosmetics and food sectors. Bioprospectors source their material in two ways:

In addition to biological resources, related traditional knowledge can also be commercially lucrative. In a major global study in 1985, a total of 122 plant-derived pure compounds were identified as being in use as drugs around the world. The medical use of 80% of these compounds correlated with traditional medical use. It was also discovered that these compounds were derived from only 94 species of plants. Given that approximately 250,000 higher plant species exist, it is likely that there are many more medical uses of plants remaining to be discovered. It is believed by many scientists that the most effective way to do so would be to screen plants on the basis of traditional medical use. However, this remains a subject of debate, and it is also argued that a random approach to plant screening and drug discovery is as effective as an approach based on traditional knowledge.

Traditional knowledge is used in different ways by different commercial sectors - it can be used to guide initial discovery and identify new leads, or to guide subsequent research after a useful compound has been identified. Traditional knowledge is usually acquired through published academic research or other secondary sources, rather than directly through field studies.

PROTECTION OF TRADITIONAL KNOWLEDGE:

The protection of traditional knowledge innovations and practices of indigenous and local communities has received increasing international attention since the adoption of the CBD in 1992. It is now a well-documented fact that TK plays an important role in the global economy and is valuable not only to those who depend on it in their daily lives but also to modern industry and agriculture. Most traditional societies depend on this knowledge for their food and healthcare needs. There are no reliable estimates of the total contributions of TK associated with traditional crop varieties (landraces) to the global economy, but the contributions of TK in the development and growth of pharmaceuticals and biotechnology-based industries are widely reported. A recent study by the Organization for Economic Co-operation and Development (OECD) has outlined the relative importance of biotechnology patent activity by concluding that the absolute number of biotechnology patents issued by the United States Patent Office and the European Patent Office has grown substantially in comparison with the total number of patents.

Traditional knowledge associated with a biological resource is an intangible component of the resource itself. TK has the potential of being translated into commercial benefits by providing valuable leads for the development of useful products and processes. The valuable leads provided by TK save time, money and investment of modern biotech firms into any research and product development. It is estimated that a hit-rate of 80 percent or more can be achieved in developing medical drugs where the screening of plants is limited to species used by indigenous communities.

The issue of protection and preservation of TK at the international level has been brought to the fore front at the instance of developing countries because of different concerns and perspectives. A large number of countries rich in genetic resources and TK and folklore believe that the traditional communities have been deprived of the benefits from the use of their knowledge, innovations and practices which have been monopolized and used by others, mainly by major companies, without their authorization and without acknowledging or rewarding them for their knowledge. Consequently, there is a perceivable asymmetry between the benefits obtained by the companies that commercial exploitation of this knowledge and the lack of benefits for its true holders. Developed countries have a moral obligation to ensure that indigenous/local peoples receive a fair and equitable share of benefits arising out of the use of their TK and the commercialization of genetic resources. Moreover, if the knowledge assets of developed countries are to be protected by means of an international agreement such as the TRIPs Agreement, it is only fair and equitable that the knowledge assets of developing countries also be similarly protected in a similar way. It is indeed the responsibility of the international community to create an egalitarian system for the availability, acquisition, maintenance and enforcement of intellectual property rights. An international regime would give holders of TK control over the use of their knowledge assets and the capacity to ensure that they are not exploited commercially.

There has been an increasing number of reported cases of misappropriation and commercial exploitation of this knowledge under patents and other IPRs. In many of these cases, claims in the patents on plants and their genetic resources are not fundamentally different from the practices applied by the traditional communities in the utilization of these plants as food, cosmetics or traditional medicines. Some of these case have been successfully challenged, such as in the cases of neem and turmeric. This raises an important issue of the legal protection of our TK.

The protection of TK is important for the conservation and sustainable development of the environment, as much of the world's crop diversity has been conserved and preserved by indigenous/local peoples, which has helped in the protection and conservation of biodiversity. Their knowledge is central to the conservation and preservation of GRs and other bio-resources. Most of these communities live in areas where the vast majority of the world's plant genetic resources (PGRs) are found. There is also the danger that the biological resources increasingly subjected to IPRs and patents are likely to be plucked to extinction, which raises concerns over their exhaustibility and loss of habitat besides the loss of lifestyles and livelihoods to indigenous communities that have nurtured and used these resources for generations. This may also ultimately would affect food security. International recognition and protection of TK would help in the protection / conservation of the environment and in the management of biodiversity.

The movement of traditional communities from their natural habitat and their increasing attraction with modern society has also raised concerns about the protection of TK, which will lead to its extinction as well will affect biodiversity. Lack of motivation in the younger generation to learn the traditions is another reason for the protection of TK. There is a fear that TK will suffer extinction with the death of the elders of the community. TK is generally viewed as being inferior, since it does not conform to the accepted scientific methods of learning in the context of the modern approach of science. Only by concerted efforts to protect it and accord it due respect can this trend be stopped. There is also a need to enable these communities to harness TK for their economic uplift and growth.

TRADITIONAL KNOWLEDGE AND BENEFIT SHARING

In India, there is an example of benefit-sharing in the case of ***Arogyapacha.*** During an ethno-botanical expedition in the tribal region of the Western Ghats in the state of Kerala, a team of scientists encountered the **Kani** practice of eating seeds of the wild plant *Trichopus zeylanicus*, and this gave them energy. The **Kani** tribe has used the plant,

locally called ***'Arogyapacha'***, for several years to help them through periods of physical exertion.

Arogyapacha was investigated and finally a standardized drug based on the **Kani** knowledge of ***Arogyapacha*** was developed. The drug called "**Jeevani**" was released for commercial production in 1995. While transferring the technology for the production of the drug to a pharmaceutical firm, the Tropical Botanic Garden and Research Institute (TBGRI) agreed to share the license fee on a 50:50 basis. In addition to this, 2 per cent of the royalties from sales is to go to the tribal community.

The **Kani's** have since then been helped to register a trust. This trust is fully owned and managed by the **Kani** tribe. About 60 per cent of the 2,000 **Kani** families of Kerala are now members of this trust. According to the trust's rules, the license fee and royalties received on account of the drug "**Jeevani"** will be in the form of the fixed asset of the trust and only the interest accrued from this amount can be used by the Kanis for welfare activities. This model was developed over a period of about 12 years from 1987 to 1999 in consultation with the **Kani** tribe.

PROTECTION FOR IK IN INDIAN ACTS:

Some of India's new laws have implications for IK and bio-resources. The following are given below:

- The Geographical Indications of Goods - Registration and Protection Act, 1999.
- The Protection of Plant Varieties and Farmer's Rights Act, 2001.
- The Biological Diversity Act, 2002.
- The Patent (Second Amendment) Act, 2002.

TRADITIONAL KNOWLEDGE DIGITAL LIBRARY (TKDL)

TKDL is a collaborative project between National Institute of Science Communication and Information Resources (NISCAIR), Council of Scientific and Industrial Research, Ministry of Science & Technology and Department of AYUSH, Ministry of Health and Family Welfare, which is being implemented at NISCAIR. An inter-disciplinary team of Traditional Medicine (Ayurveda, Unani, Siddha, Yoga) experts, patent examiners, IT experts, scientists and technical officers are involved in creation of TKDL for Indian Systems of Medicine.

The Project TKDL involves documentation of the knowledge available in public domain on traditional knowledge from the existing literature related to Ayurveda, Unani and Siddha, in digitized format in five international languages which are English, German, French, Japanese and Spanish. Traditional knowledge Resource Classification (TKRC), an innovative structured classification system for the purpose of systematic arrangement, dissemination and retrieval has been evolved for about 10,500 sub-groups against one group in International Patent Classification (IPC), i.e. AK61 K35/78 related to medicinal plants.

INDIAN SYSTEMS OF MEDICINE, AYURVEDA

TKDL integrates widely scattered and distributed references on the Traditional knowledge systems in Ayurveda of India in a retrievable form. TKDL acts as a bridge between the traditional and modern knowledge systems, a bridge between the knowledge contained in an old **Sanskrit Sloka** and the computer screen of a patent examiner, thus breaks the language and format barrier of the prior art available in authorative text books of Ayurveda in **Hindi** and **Sanskrit**. TKDL is not a prior art.

There are 36,000 formulations that are transcribed from 14 Ayurvedic texts and presented in the digital library are based on well-tested Ayurvedic principles. In fact, **Ayurveda** and other Indian Systems of Medicine are formal systems of traditional

knowledge. There are 3,67,528 registered practioners in **Ayurveda**, 41,221 in **Unani,** 12,915 in **Siddha** and 388 in **Naturopathy** and annually there are 7,070 graduates and 645 post-graduates in **Ayurveda,** 1280 graduates and 35 post-graduates in **Unani,** 150 graduates and 70 post-graduates in **Siddha** were trained professionally to take up the practice.

CONCLUSION:

The intrinsic value of Biological diversity and of the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values and its components are to be taken care properly for the better management of biological resources and biodiversity for the welfare of human beings for better, and healthier as well as peaceful living on earth.

Besides law enforcing forces and regulations of the Governments, it is always better to involve the people in a “Participatory Mode” including Tribal people, farmers, ecologists, illiterate villagers, for the conservation and protection of Biodiversity wealth of our great Nation. Awareness creation among people, school children, students and teachers in the colleges, Universities is very important to conserve the biodiversity wealth. Participatory mode of involvement of the people at ground level to acquire more knowledge about the biodiversity conservation will help to maintain and sustain the bioresources and biodiversity. The involvement of local people and their willing participation alone could save the national wealth of biodiversity.

It is difficult to solve and manage and conserve the biological diversity by the State Government or Central Government alone but the people of our great nation have to be aware of our natural biodiversity wealth of our country and they should take all measures to conserve and protect our rich biodiversity not only for better living of our present generation but also for our future generations.