
Blending of Traditional and Modern knowledge: Understanding Indian performance on Intellectual Property Rights

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Abstract

The creative and innovative traditions in various developing countries have been shrouded by historians and policy-induced blinders. Decades of the recent past have witnessed several significant shifts in the structure of societies, irreversible geo-political readjustments, internationalization of business practices, liberalized national economic and industrial policies aided by unprecedented advances in science and technology. Progressively, as human endeavors pivot on "knowledge", competitiveness among nations, corporations and individuals will be steered by an integrated ability to access, comprehend, generate and finally transform "knowledge" to its "value-added" and "useable form" in time bound innovation processes. Intellectual Property Rights (IPR) provides the legal frameworks for ownership, protection, enforcement and authorized sharing of Products of human creativity. It is emphasized that blending of traditional and modern knowledge together certainly would assist each other to produce a substantial body of knowledge. Traditional knowledge (TK) includes information of different kinds and functions developed in ancestral times but subject to contemporary improvement and adaptation. It is expressed in various documented and non documented forms, and may possess commercial value depending on its potential or actual use. The difficulties of defining TK should not, however, impede further work on it at the national or international level. Traditional knowledge is not covered under any of the IPRs modalities; it would belong to the public domain and be freely exploited. However, this technically correct view ignores the fact that TK may be deemed subject to customary laws that recognize other forms of ownership or possession rights.

The aim of this paper is to understand the importance and scope of TK – which includes its widespread use in traditional medicine and farming, why there is need to protect TK, policies undertaken by government to protect TK rights in India and international IPRs law to overcome incompatibility between the concepts of western IPRs and the practices and cultures of local and indigenous communities of developing countries. Traditional knowledge available in archival documents can assist in attaining good rank for India in the world in many areas of knowledge.

This paper aims to engage policy makers, groups, agencies and a host of governmental ministries. Our aim is to contribute to informed public debate about, and policy making concerning, TK and IPRs. The protection under intellectual property rights (IPRs) of traditional and indigenous knowledge (TK) has received growing attention since the adoption of the Convention on Biological Diversity (CBD) in 1992. Numerous contributions by academics, NGOs and governments have considered the need to provide some form of protection to TK. However, significant divergences exist as to whether IPRs should be applied and, if that were the case, which would be the rationale and modalities of protection.

Keywords: Traditional knowledge, Intellectual Property Rights, Convention of Biological Diversity, Knowledge.

INTRODUCTION:

Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions. (United Nations Declaration on the Rights of Indigenous Peoples, Article 31, 2007

Intellectual property rights are the rights of authors of literary and artistic works (such as books and other writings, musical compositions, paintings, sculpture, computer programs and films) are protected by copyright, for a minimum period of 50 years after the death of the author. The main social purpose of protection of copyright and related rights is to encourage and reward creative work. The protection of such distinctive signs aims to stimulate and ensure fair competition and to protect consumers, by enabling them to make informed choices between various goods and services. The protection may last indefinitely, provided the sign in question continues to be distinctive. The purpose is to provide protection for the results of investment in the development of new technology, thus giving the incentive and means to finance research and development activities. A functioning intellectual property regime should also facilitate the transfer of technology in the form of foreign direct investment, joint ventures and licensing. Other types of industrial property are protected primarily to stimulate innovation, design and the creation of technology. In this category fall inventions (protected by patents), industrial designs and trade secrets. The protection is usually given for a finite term (typically 20 years in the case of patents).

Traditional and indigenous knowledge (TK) has been used for centuries by indigenous and local communities under local laws, customs and traditions. It has been transmitted and evolved from generation to generation. TK has played, and still plays an important role in the vital areas such as food security, the development of agriculture and medical. TK is a central component for the daily life of millions of people in the developing countries. Traditional Medicine (TM) serves the health needs of a vast majority of people in developing countries, where access to “modern” health care services and medicine is limited by economic and cultural reasons. For instance, the per capita consumption of TM products is, in Malaysia; more than double that of modern pharmaceuticals. TM is also significant in more advanced developing countries such as South Korea, where the per capita consumption of TM products is about 36% more than modern drug. The market for ayurvedic medicines is estimated to be expanding at 20% annually. Sales of medicinal plants have grown by nearly 25% in India in past ten years (1987-96), the highest rate of growth in the world (Masood, 1997). But the per capita expenditure in India on medicines per annum is amongst the lowest in the world. Today, through TKDL, India is capable of protecting some 0.226 million medicinal formulations and at zero direct cost. (WIPO Magazine, 2011). It is often the only affordable treatment available to poor people and in remote communities. Similarly, the use and continuous improvement of farmers’ varieties (landraces) is essential in many agricultural systems. In many countries, seed supply fundamentally relies on the “informal” system of seed production which operates on the basis of the diffusion of the best seed available within a community, and on its movement, even over large distances during migration or after disaster. Furthermore, TK is the origin

of a great variety of artistic expressions, including musical works and handicrafts. TM also plays a significant role in the developed countries, where the demand for herbal medicines has grown in the recent years. The world market for herbal medicines has reached, according to one estimate, US\$43 billion, with annual growth rates of between 5 and 15%. Plants, in particular, are an important source of medicines (WHOa,2000 and Pranoto,2001). The knowledge of traditional and indigenous farmers relating to cultivated plants has also been a central element for the development of new plant varieties and, most importantly, for food security on a global scale. The importance of TK for its creators and for the world community at large, and the need to foster, preserve and protect such knowledge, has gained growing recognition at international level. Thus, in 1981 a WIPO-UNESCO Model Law on Folklore was adopted; in 1989 the concept of “Farmers Rights” was introduced in the Food and Agriculture Organization (FAO) International Undertaking on Plant Genetic Resources; in 1992 the Convention on Biological Diversity (CBD) specifically addressed the issue (article 8(j))⁹. In 2000, an Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore was established by the World Intellectual Property Organisation (WIPO) and it first meet in April 2001.

Debate about the impact of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organisation (WTO) has broadened. One area of concern is its impact on traditional and indigenous knowledge (TK). This paper discusses importance of TK in developing countries and policy issues surrounding the protection of TK given at the international level by different forums.

LITERATURE REVIEW:

Greaves,(1994),“indigenous knowledge is something more than matter-of-fact information. Rather, it is usually invested with a sacred quality and systemic unity, supplying the foundation on which members of a traditional culture sense their *communities*, personal identity, and ancestral anchorage.”

Dutfield(2000b), Fishman (2001),”Public domain in the IPRs field generally includes any information not subject to IPRs or for which IPRs have expired. Thus, to the extent that TK is not covered under any of the IPRs modalities, it would belong to the public domain and be freely exploited. However, this technically correct view ignores the fact that TK may be deemed subject to customary laws that recognise other forms of ownership or possession rights.”

Mashelkar, (2000)“...it is only logical and in consonance with natural justice that they are given a greater say as a matter of right in all matters regarding the study, extraction and commercialization of the biodiversity.”

Pushpangadhan(1996),”It is an irony that the communities who have preserved the germplasm used in developing new strains, for thousands of years, are deprived of any direct or indirect benefits. It is natural justice that the rights of the indigenous communities in this matter be legally protected.”

Dutfield, (1999),”The knowledge, innovations and practices of indigenous peoples and local communities are manifestations of their cultures. Protecting a peoples’ culture means maintaining those conditions that allow a culture to thrive and develop further... Therefore, protecting a peoples’ cultural heritage involves inter alia maintaining the link between a people and natural features of the landscape and naturally occurring species of plants and animals”

Indian delegation to WTO, WT/GC/W/147,(2000) “A material transfer agreement would be necessary where the inventor wishes to use the biological material and a transfer of information agreement would be necessary where the inventor bases himself on indigenous or traditional knowledge. Such an obligation could be incorporated through inclusion of

provisions in Article 29 of the TRIPS Agreement requiring a clear mention of the biological source material and the country of origin...”

UNDEP, 1992,”Indigenous knowledge is that knowledge which is held and used by a people who identify themselves as indigenous of a place based on a “combination of cultural distinctiveness and prior territorial occupancy relative to a more recently arrived population with its own distinct and subsequently dominant culture.”

UNEO/COP, 1992,”Traditional knowledge can be contrasted with cosmopolitan knowledge, which is drawn from global experience and combines western scientific discoveries economic preferences and philosophies with those of other widespread cultures.

OBJECTIVES:

- 1.) To understand the importance and scope of TK.
- 2.) To evaluate the need to protect TK which includes its widespread use in traditional medicine and farming?
- 3.) To assess policies undertaken by the government to protect TK rights in India.
- 4.) To explain international IPRs law to overcome incompatibility between the concepts of western IPRs and the practices and cultures of local and indigenous communities of the developing countries.

THE SCOPE OF TRADITIONAL KNOWLEDGE:

Traditional knowledge encompasses very different types of knowledge. These may be distinguished by the elements involved, the knowledge’s potential or actual applications, the level of codification, the individual or collective form of possession, and its legal status. TK includes, for example, information on the use of biological and other materials for medical treatment and agriculture, production processes, designs, literature, music, rituals, and other techniques and arts. This broad set includes information of a functional and of an aesthetic character, that is, processes and products that can be used in agriculture or industry, as well as intangibles of cultural value. Mostly, TK comprises of knowledge which has been developed in the past, but which still continues to be developed. Most TK is, in effect, of non-contemporary nature; it has been used for generations and in many cases collected and published by anthropologists, historians, botanists or other researchers and observers. However, TK is not static; it evolves and generates new information as a result of improvements or adaptation to changing circumstances. The context of TK varies significantly and its forms of expression. Some TK is codified, that is, formalized in some way (eg textile designs, ayurveda traditional medicine). A great part of TK, however, is non-codified or tacit, such as, “folk”, “tribal” or “indigenous” medicine, which is based on traditional beliefs, norms and practices accumulated through centuries old experiences of trial and error, successes and failures at the household level, and passed to successive generations through oral tradition. TK may be possessed by individuals (e.g. healing practices and rituals), by some members of a group, or be available to all the members of a group (“common knowledge”), for example with knowledge on herbal-home remedies which is held by millions of women and elders. When its application, and in particular the delivery of TK-based products, can be made through commercial channels TK may be of commercial value. While some TK can be used and understood outside its local/traditional/communal context, this is not always the case. There are often spiritual components in the TK peculiar to each community. Knowledge that cannot be utilized beyond its communal context has little or no commercial value, despite the value that such knowledge may have for the life of the originating community. To summarize TK includes

information of different kinds and functions, developed in ancestral times but subject to contemporary improvement and adaptation. It is expressed in various documented and non documented forms, and may possess commercial value depending on its potential or actual use. The difficulties of defining TK should not, however, impede further work on it at the national or international level. The protection under intellectual property rights (IPRs) of traditional and indigenous knowledge (TK) has received growing attention since the adoption of the Convention on Biological Diversity (CBD) in 1992. Numerous contributions by academics, NGOs and governments have considered the need to provide some form of protection to TK. However, significant divergences exist as to whether IPRs should be applied which would be the rationale and modalities of protection. Despite all these efforts, many questions about objectives, tools and feasibility of TK protection remain unanswered.

Overall the main arguments for granting protection to TK include:

- Equity considerations,
- Conservation concerns,
- The preservation of traditional practices and culture,
- The prevention of appropriation by unauthorised parties of components of TK, and
- Promotion of its use and its importance in development.

Reasons for protection of Traditional knowledge

To understand the concept of TK in the context of IPRs, where protection essentially means to exclude the unauthorized use by third parties. Others regard protection as a tool to preserve traditional knowledge from uses that may erode it or negatively affect the life or culture of the communities that have developed and applied it. Protection here has a more positive role in supporting TK-based communities' livelihoods and cultures, as proposed by the Organization of African Unity's (OAU's) Model Law and its definition of community rights.

Equity

The protection of TK would be necessary to bring equity to essentially unjust and unequal relations. An example of this rationale is found in plant genetic resources. Traditional farmers both conserve and use plant genetic resources. The value of plant genetic resources is preserved and enhanced by their utilization for planting, seed production and continuous selection of the best adapted farmers' varieties (landraces). Such farmers generally interact among themselves on the basis of barter or exchange across the fence, thus fostering the diffusion of their varieties and their further development. However, the varieties conserved and developed by farmers are later collected, subject to research and breeding, and enter the commercial channels through seed companies. While the latter can protect the improved varieties under plant breeders' rights (PBRs) and benefit from them, the farmers are not compensated for the germ plasma they have contributed and the value they have created. An essential characteristic of farmers' varieties is their variation over time. For this reason, such varieties cannot normally meet the stability and uniformity requirements imposed under PBRs. The basic point in this criticism is that traditional/indigenous farmers are not paid for the value they deliver, since breeders and seed companies are not charged a price for the samples they obtain, and neither is there any later compensation or sharing of benefits with the farmers. A similar argument applies to other intangible components of TK. For regulatory purposes a distinction may be made between access to and use of genetic resources vis-à-vis access to and use of TK. For instance, national access legislation (as enacted, e.g, in The Philippines, Andean Group countries, Brazil and Costa Rica) in some cases applies to genetic resources only while in others it also covers TK as an intangible component.

Conservation

A second factor underlying the claim for protection of TK is based on the importance of such knowledge for conservation purposes. Thus, maintenance of biological diversity in farming systems generates value for the global community. IPRs might be used to generate income to sustain activities that would otherwise be abandoned. If traditional farmers for example, abandoned the use and breeding of farmers' varieties attracted by the higher income obtainable through planting higher yielding modern varieties then a serious loss of biodiversity could occur. However, on the conceptual level, it is doubtful whether the protection of farmers' varieties under an IPRs system would have any positive impact on their conservation or stimulate breeding activity, and whether protection would serve the purpose of strengthening the rights of communities and traditional farmers over their resources. Under this approach, the protection of TK helps meet society's broader objectives for the conservation of the environment, sustainable agriculture and food security.

Preservation of traditional lifestyles

Others see the protection of TK as providing a framework to encourage the maintenance of practices and knowledge embodying traditional life styles. In this sense, the notion of "protection" is quite different from the notion applied under IPRs. The preservation of TK is not only a key component of the right to self-identification and a condition for the continuous existence of indigenous and traditional peoples; it is also a central element of the cultural heritage of humanity. The crisis affecting the world's diverse cultures and languages is, according to some estimates, far greater than the biodiversity crisis. Around 90% of the 6000+ currently spoken languages (and the cultures expressed by them) may have become extinct or face extinction in the next 100 years. The Crucible group suggests that by vesting legally recognized ownership of knowledge in communities through IPRs it will raise the profile of that knowledge and encourage respect for it both inside and outside the knowledge holding communities.

EXAMPLES OF TRADITIONAL KNOWLEDGE IN WORLD:

1.) *Traditional knowledge and Bikram Yoga*

Bikram Choudhury is the founder of a yoga technique known as Bikram Yoga. Instructors across the United States must obtain a license from him in order to teach the yoga sequence found in Bikram Yoga and/or to call a yoga studio Bikram Yoga. Bikram Choudhury has aggressively enforced claims of copyright and trademark protection – including the claim that the sequence of asanas in *Bikram's Beginning Yoga Class* constitutes his copyright. Many yoga practitioners object to the idea that Choudhury can have exclusive control over a series of postures derived from Indian traditional knowledge and practices. Choudhury first registered the copyright for *Bikram's Beginning Yoga Class* in 1979 and subsequently filed copyrights for various books, audiotapes and videotapes. In 2002 Choudhury filed for copyright for the yoga sequence itself – claiming that the US Copyright Office acknowledges his exclusive right to the distinct series of postures and breathing exercises comprising the sequence. While Choudhury recognizes that *asanas* generally are in the public domain, he claims that his sequence constitutes a copyrightable compilation of material. Choudhury's argument is that he has exerted specific skill and labor in the selection and assemblage of the *asanas* into a specific sequence. In 2005 the United States District Court for the Northern District of California heard a case – *Open Source Yoga Unity v. Bikram Choudhury* – testing these claims. Open Source Yoga Unity (OSYU) filed for a declaratory judgment seeking an order that Choudhury does not have enforceable rights or trademark rights because individual yoga *asanas* constitute functional information rather than expressive creative content. The Court denied motions from both sides for summary judgment thus leaving questions of trademark invalidity, whether the sequence is

in the public domain, the copyright ability of the sequences and the proper publishing date, unresolved. The case was later settled by the parties with no disclosure regarding the details of the settlement. Choudhury is still free to take legal action against other yoga practitioners and trainers in the United States. There is current lobbying from government representatives in India to mount an effective legal challenge against Bikram Yoga arguing that the copyright in yoga *asana* sequences constitute a misappropriation of traditional knowledge unique to India. In India there is a large-scale effort to catalog the estimated 1500 *asanas* in order to prevent cases like this in the future.

2.) In **South India** the medicinal knowledge of the Kani tribes led to the development of a sports drug named *Jeevani*, an anti-stress and anti-fatigue agent, based on the herbal medicinal plant *arogyapaacha*. Indian scientists at the Tropical Botanic Garden and Research Institute (TBGRI) used the tribal know-how to develop the drug. The knowledge was divulged by three tribal members, while the customary rights to the practice and transfer of certain traditional medicinal knowledge within the Kani tribes are held by tribal healers, known as *Plathis*. The scientists isolated 12 active compounds from *arogyapaacha*, developed the drug *Jeevani*, and filed two patent applications on the drug. The technology was then licensed to the Arya Vaidya Pharmacy, Ltd., an Indian pharmaceutical manufacturer pursuing the commercialization of Ayurvedic herbal formulations. A trust fund was established to share the benefits arising from the commercialization of the TK-based drug.

3.) India foils Chinese bid to patent 'Pudina'(2010)

India has foiled a major Chinese bio-piracy bid to patent the use of medicinal plants 'pudina'(mint) and 'Kalamegha'(andrographis) for the treatment of H5N1 avian influenza or bird flu. The Council of Scientific and industrial Research(CSIR), with the help of India's Traditional Knowledge Digital Library(TKDL), dugout formulations from ancient Ayurveda and Unani texts, like 'Cakradattah', 'Bhaisajya Ratanavali', 'Kitaab-al-Haawi-fil-Tibb' and 'Qaraabaadeen Azam wa Akmal', dating back to 9th century, to show that both 'pudina' and 'Kalamegha' have been widely used in India since ages for influenza and epidemic fevers. After receiving exhaustive evidence from CSIR that confirmed India's stand, the European Patent Office(EPO) on 10June 2010 cancelled the decision to grant patent to Livzon, a major Chinese pharmaceuticals company, on the medicinal properties of pudina and kalamegha for treating bird flu(<http://timesofindia.Indiatimes.com>)

4.) India thwarts US company bid to patent Pomegranate (August,2012)

India has foiled an attempt made by a US company to claim a patent at the United states Patent and Trademark Office(USPTO) on the use of pomegranate for the treatment of ulcers.

MDIP LLC had filled a patent publication number 20100291249 with title 'Pomegranate derived products for the treatment of skin sores and lesions' in July 2010 claiming the usefulness of Pomegranate (*punica granatum*) for the treatment of ulcer, wound, acne vulgaris and as an antiseptic.

5.) **The Traditional Knowledge Digital Library (TKDL)**, a unit of Council of Scientific & Industrial Research(CSIR) submitted prior art evidences in December 2010 in the form of references in three books from 11th century to 20th century. The books that were referred to as evidence were Muheet- e- Aza, written by Mohammad Azam Khan in the 19th century, Al- Qaanoon- fil- Tibb written by Abu Ali Ibn-e- Sina in the 11th century and Quraabaadeen Najm- al- Ghani authored by Mohammad Najm Ghani Khan in the 20th century. The TKDL director was given printed prior arts are available in the Indian system of medicine like Ayurveda, Unani and Siddha.

COMPARISON OF PATENT FILLED IN INDIA AND THE U.S. FOR TRADITIONAL KNOWLEDGE:

While patent filing at the Indian patent office has seen a rise of 23.97 per cent from 2007-08 to 2012-13, assessment shows that only a meager 22 per cent of them have been filed by Indian applicants in 2012-13. While 43,663 patents were filed in 2012-13, a majority or 78 per cent were international applications.(WIPO 2012)

“According to the World Intellectual Property Indicators (WIPO-2012) report, while China’s contribution to the rise in patent applications globally has increased from 37.2 per cent between 1995-2009 to 72.1 per cent between 2009-11, India’s contribution decreased from 3.5 per cent between 1995-2009 to 2.7 per cent between 2009-2011. The report shows that while China topped the global list by filing 503,582 patent applications, India was ranked seventh with 42,291 applications,” said Rakesh Kumar, Deputy Controller of the Patents and Designs and Head of Mumbai office.

“There has been a great improvement in the filing of patents. But indigenous filing of patent applications is only 22 per cent currently and needs to be increased by encouraging research and development in India. Our target is to double the number of patents filed by Indian applicants in the next few years,” said E M Sudarsana Natchiappan, Minister of State, Ministry of Commerce and Industry, government of India.

According to figures given by the Office of the Controller General of Patents, Designs & Trade Marks, Mumbai, for the 2013-14 financial year, 28,850 patents have been filed upto November 2013. While 11,751 applications were examined in 2007-08, 12,186 were examined in 2012-13.

Significantly, figures show that as far as granting of patent is concerned, India has seen a sharp drop of 72.96 per cent from 2007-08 (15,261 granted) to 2012-13 (4,126 granted). For 2013-14, 2,185 patents have been granted up to November 2013.

According to the patent office, maximum applications in 2012-13 were filed in mechanical (around 9,000), followed by chemical (7,000). While computer-related applications accounted for 4,500, about 4,300 were filed in the field of drugs, followed by 2,500 in electrical and close to 900 in biotech.(Indian Express, delhi Jan,2014)

ORGANISATIONS IN INDIA FOR IPR:

In India, the Protection of Inventions Act 1856 was based on the British patent Law of 1852. Under the Act of 1856, certain exclusive privileges were granted to inventors and manufacturers for a period of 14 years. This Act was modified in 1859. Under this Act, patent monopolies, which were called exclusive privileges granted for a period of 14 years from the date of filing specification. These privileges were making, selling and using inventions in India and authorizing others to do so. Subsequently, the Patents and Designs Protection of Inventions Act was enacted in 1872. Thereafter the Protection of Inventions Act was enacted in 1883. These Acts were later consolidated as the Inventions and Designs Act 1888. In 1911, the Indian Patents and Designs Act was enacted. The realization that the laws were not designed to motivate or protect Indian inventors led to the enactment of more progressive Indian Patents Act of 1970.

Indian Merchandise Act of 1889 that awarded exclusive rights to individuals and business to use their ‘recognized brands’ and enforce against other traders has through a series of stages over the years into the currently active Trademarks Act of 1999. The other legislation that govern Intellectual property rights in the country are:- The copyrights, 1957; The Geographical indications of Goods act, 1999 and the Designs act, 2000.

India has made its regime TRIPS compatible, it is not entirely clear if the new regime would facilitate the participation of Indian companies in the knowledge intensive global

production and R&D networks and if it is appropriate for an economy that is expected to grow rapidly enlarging the demand for a variety of products and services.

INTERNATIONAL ORGANISATIONS TO PROTECT TRADITIONAL KNOWLEDGE

The issue of TK has been addressed at several international organizations and forums. The adoption of article 8(j) of the CBD triggered the consideration of this issue. That provision is couched in programmatic terms, which are not operative or self-executing. In order to be applicable, national laws should determine how the communities' rights are to be recognised and enforced. However, it was an important step towards a more systematic treatment of the issue at the national as well at the international levels. Issues relating to TK and intellectual property have been dealt with by UNEP/CBD, WIPO, UNCTAD and WTO. Some of these organisations have cooperated with each other. Thus, WIPO and UNEP undertook joint case studies on the role of IPRs in sharing of benefits from the use of TK and associated biological resources, and FAO and the CBD Secretariat regularly cooperate on issues of common interest in agriculture. Of course, the role of these different organisations and fora significantly varies. While WIPO, WTO, FAO and the CBD may provide the framework for international negotiations, currently no negotiations are conducted under the auspices of UNCTAD, although it has convened a workshop on TK. In addition, while WIPO is a specialised UN Organisation that promotes the protection of intellectual property and WTO deals with international trade (including TRIPS) in general, the CBD and FAO have a thematic focus on issues relating to genetic resources.

CONCLUSION:

Having seen various aspects of traditional and modern knowledge we reach to a conclusion that there is urgent need to reevaluate objectives and modalities. The issues relating to TK should be addressed in a holistic manner, including ethical, environmental and socio-economic concerns. There are, in addition, many still unresolved technical issues such as the problem of collective ownership and the modes of enforcement of rights. IPRs may be one of the tools to be used but their limits and implications should be clearly understood. In particular, a balance should be obtained between the protection and the promotion of the use of such knowledge. It is unclear the extent to which the various proposals made for the protection of TK reflect the aims and cultural values of the traditional and indigenous communities they intend to serve. The future action in this field may thus include:

- promoting the development, at the national level, of an holistic approach towards the protection of TK, including the resolution of underlying issues such as land rights and the need to respect and maintain the lifestyles of local and indigenous communities;
- considering the differing needs for the protection and promotion of TK in different areas, such as TM and plant genetic resources;
- continuing work in WIPO, UNCTAD, WTO and in other fora in order to clarify the possible role, scope and content of systems of protection for TK;
- ensuring a broad and effective participation of representatives from local and indigenous communities in the definition and implementation of any system for the protection of TK.
- improve awareness of the role of TK in fostering local innovation and development.

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