

Implications of Prior Informed Consent for the conservators of indigenous biological diversity of Northeast India

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Despite the 1992 UN Convention on Biological Diversity (CBD) requiring the rendering of due credit and benefit to local biodiversity conservators and Traditional Knowledge (TK) holders, very few examples of benefit sharing can be seen on the ground in India. Looking to the importance of the requirement, a project on indigenous natural resources management practices of the tribal peoples of Northeastern India was implemented in the year 2005 in different regions of Arunachal Pradesh and Meghalaya. The primary goal of the project was to explore the hidden wisdom of tribal peoples regarding indigenous knowledge and use, and conservation of biodiversity. In the project, workshops of TK holders together with personal interviews were organized to seek their views and perspectives about Prior Informed Consent (PIC) and Intellectual Property Rights (IPR) relating to their knowledge and practices. Two major types of incentives to the knowledge holders can be identified: materialistic and non-materialistic. A society of poor economic status but high ethical values needs non-materialistic incentives. The majority of these people were of the opinion that their knowledge could be displayed in full text for non-commercial and academic purposes. Research on indigenous resources and cashing the name and fame by formal scientists, needs to be formalized through the community and knowledge holders, with explicit acknowledgement of their wisdom. With the changing and variability in altitude, biodiversity, geography, culture and social norms, the ethics and ways of accessing biodiversity were found to vary from group to group. Knowledge holders living in areas of rich biodiversity at high altitudes required the offer of maximum benefit percentage towards the welfare and conservation of community-based biodiversity. Gender variability also determined percentage of benefit sharing and types of rewards suggested for the TK holders.

Keywords: Traditional knowledge, Local culture, Biodiversity, Prior Informed Consent, Intellectual Property Rights, Benefit Sharing

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Traditional knowledge (TK) is the information that people in a given community, based on experience and adaptation to a local culture and environment, have developed over time and continues to develop. This knowledge is used to sustain the community and its culture and to maintain the genetic resources necessary for the continued survival of the community¹⁻⁵. Traditional includes mental inventories of local biological resources, animal breeds, local plant, crop and tree species. TK also encompasses belief systems that play a fundamental role in people's livelihoods, maintaining their health, and protecting and replenishing the environment^{2,4-9}. The term *traditional* used in describing this knowledge does not imply that this knowledge is old or non-technical in nature, but is *tradition based*. It is *traditional* because it is created in a manner that reflects the traditions of the communities, therefore not relating to the nature of the knowledge itself, but to the way in which that knowledge is created,

preserved and disseminated^{2,10}. For example, the use of *Plao-noi* in Thailand for the treatment of ulcers, the use of cactus (*Hoodia gordonii*) by Kung Bushmen in Africa to starve off hunger, use of turmeric in India against wound healing, use of *Ayahuasca* in the Amazon basin for sacred religious and healing purposes and use of *Joublie* in Cameroon and Gabon as a sweetener are world known examples of traditional knowledge². The local culture, spirit, and social and ethical norms associated with these traditional knowledge is being decisive factors for conserving and sustaining the natural resources and biodiversity over the century^{3-5,10}.

The 1992 Convention on Biological Diversity (CBD) is an international treaty resulting from the Earth Summit in Rio de Janeiro, where world leaders agreed on a comprehensive strategy for sustainable development. The rapid depletion of environmental resources and the need to reward both users and providers gave rise to CBD, which for the first time

formally acknowledged the value of indigenous knowledge systems. The CBD established a framework for providing access to genetic resources, maintain world's biological diversity and fair and equitable sharing of the benefits arising from indigenous knowledge. The CBD declares the obligation to obtain Prior Informed Consent for access to genetic resources¹². The Bonn Guidelines (2002) further linked genetic resources with traditional knowledge in the obligation to acquire Prior Informed Consent. Prior Informed Consent is the approval in advance for the use of one's genetic resources and any associated TK. It is the norm under CBD and PIC that sufficient information should be provided to a community, either by the intellectual property office or other parties regarding the aims, risk or implication of using the knowledge, including its potential commercial value^{2,3,5,10-12}. The new Biodiversity Act (2002) of India is a first step in ensuring implementation of CBD at the domestic level in India; it is far from perfect as it fails to provide adequate provisions to ensure proper benefit sharing and access to biological diversity¹³. There are various studies on Prior Informed Consent of traditional knowledge holders in India. Looking to the emerging needs about what really the knowledge holders think, perceive and argue regarding the benefits and other associated dimensions of PIC and IPR has necessitated in designing the study.

Methodology

The methods of researchable problems in social sciences make much differences of learning and exploration of indigenous knowledge systems^{4, 14}. In the study, not only the opinion of traditional knowledge holders have been ascertained about benefit sharing related to traditional practices but also many unknown issues, which are still very seldom touched in the academic fields have been highlighted. Looking to the nature of study, qualitative methods were chosen from local traditional knowledge holders about how they use, perceive, conserve and value the environment and natural resources based on their years of experiences¹⁵. The resource beneficiaries' ideas about natural resources may differ from those of scientists. Hence, the qualitative data analysis allowed the researchers to discover the means, considering the choice and meaning of words and the consistency of responses related to indigenous knowledge systems and its associated dynamics¹⁶.

The traditional knowledge holders were the part of the study from different socio-cultural backgrounds

and ethnicity of Arunachal Pradesh and Meghalaya, who have been selected purposively and were belonging to various climatic ecosystems. These knowledge holders were from *Monpa* (living in temperate and sub-temperate climates), *Adi* (sub-tropical climate) and *Khasi* (sub-temperate climate) tribes, which have been explored from different villages of Tawang, Dirang, Pasighat and Ribhoi district and circles of Arunachal Pradesh and Meghalaya, respectively for their known and well-practiced indigenous practices related to human health, agriculture, ethnoveterinary practices, ethnic foods and technologies / practices and biodiversity conservation. The total sample size of the traditional knowledge holders was 360 including workshops participants. Sixty male and 60 female traditional knowledge holders were explored from each tribe. In the sample, the person who was locally recognized as knowledgeable and also those who know but can not practice in reality; were integrated to have the wide range of response over the issues of benefit sharing of traditional knowledge. The agreement score over different types of benefits and socio-customary and ethical dimensions of traditional knowledge holders were measured using a 3-point continuum scale. Traditional knowledge holders with positive sentences (parameters) strongly agree was assigned a score of 3, moderately agree a score of 2 and lower agreement a score of 1. For the negative sentences the scoring technique was reversed accordingly¹⁷. Frequency, percentage and mean have been used as descriptive statistical tools to deal with the qualitative data and draw inference from the study.

The age of male traditional knowledge holders varied from 35-45 yrs, while that of female varied from 40-70 yrs. Majority (90%) of traditional knowledge holders were having the agriculture and animal husbandry as major occupation followed by collection and selling of forest based products. To know the different types of response towards various aspects of PIC and IPR towards TK and indigenous biodiversity, they have been interviewed individually and in groups. A principle help has been taken from the document of CBD and NIF to develop the interview schedule^{2,18,19}. Their responses were also recorded in village workshops (Figs. 1-4). One day workshop of TK holders have been organized on PIC at Dirang, West Kameng district of Arunachal Pradesh and Barapani, Meghalaya. In the workshops, both community leaders and TK holders from different remote and transitional villages of varying

age were invited to participate and discuss the issues related to tangible and intangible benefits arising from traditional knowledge systems. Before processing the interview and workshops, the consent of local community has been taken as per the guidelines of CBD^{2,18,19} while discussing and exploring traditional practices pertaining to ethnic foods, human healthcare, agriculture and natural resources management. These practices were submitted to the National Innovation Foundation (NIF), Ahmedabad, Gujarat. These workshops were also chosen as one of the platform to reward the outstanding TK holders, so that they could get rapid recognition in their village community through activated knowledge network.

Results and discussion

Benefit sharing over community knowledge and traditional practices

Numerous contributions by academics, NGOs and Governments have considered the need to provide some forms of recognition of and protection for indigenous knowledge systems. However, significant disagreement exists as to whether IPRs should be applied and, if so, what would be the rationale and modalities of protection? First, it is necessary to understand the importance and scope of TK, which includes its widespread use in traditional medicines, ethnic foods, agriculture and ethnoveterinary practices (CBD, Section 1) along with the question of its definition. The starting point for any discussion about possible forms of protection should then be to clarify why there is a need to protect this knowledge, and what ways and means are required to achieve its protection²⁰. To realize this goal, and before addressing the issues of IPR, attention must focus on the PIC of TK holders, which allows for the further process in the consideration of IPR for equitable benefit sharing arising from applications of traditional knowledge^{2,3,10,21-23}.

There are three kinds of knowledge systems identified within communities, namely: private knowledge that may be traditional or modern in nature developed or created by an individual; modified practices or knowledge based on informal research or experiences; and traditional knowledge, which is known to and / or practiced by the whole community, called *Community Knowledge*. The rights and benefits shared vary among these three knowledge systems^{10,23}. Benefits arising from community based knowledge or practices, for example use of medicines that are plant-based, should

not be less than 50% of any benefits realized, as maintained by 95.5% of the TK holders (Table 1). The major ethic of keeping this proportion of the benefit share arising from community knowledge was to provide a major thrust for the conservation of the natural habitat from where a particular plant originated. In the case of private knowledge based on plant products, the proportion of shared benefits may be kept at 25% according to the opinion of 92.5% of the respondents.

It was a matter of great debate among the participants of both of the workshops that refinement and validation of community-based traditional practices are required to make them more widely known among other non-user groups. In this regard, 85% felt that a minimum of 10% benefit share should be applied for this purpose. It was reasoned that, since the practices are used and appreciated by whole community and lie in the public domain, after refinement they can be transferred to similar situations with little effort and without external interventions. 95% of the respondents agreed that, in the case of any improvements or modifications to existing community-based practices undertaken by a person, that individual modifier/innovator should ethically speaking, hold the right to a greater share of benefits for his creativity in enhancing the efficacy of a particular practice. Also, simultaneously they would be interested to share the remaining benefit with community members only, because directly or indirectly it is the part of public domain from where the required plant part product or genetic materials are accessed in the formulation of medicines or practice.

To see the variability in response pattern and proportion of benefit sharing arising from community knowledge, all the respondents were divided into two broad categories, namely transitional villages and remote villages. The traditional knowledge holders belonging from the remote villages within areas of rich biodiversity were of the opinion (87.24%) that a

Table 1 — Benefit sharing of community based practices (herbal, NRM practices, ethnic foods and agriculture)

Particulars	Mean response of participants in %	Proportion of benefit out of 100
Community/village	95.5	40.0
Innovation promotion fund	85.0	20.0
Researchers who add value	75.4	5.0
Institutional overheads	89.0	10.0
Conservation of natural resources	92.5	25.0

maximum benefit share (75%) should be allocated to a community fund enabling its utilization for various purposes to promote a particular indigenous practice and conserve the related biodiversity. The respondents from the transitional villages, on the other hand, living distantly from high levels of biodiversity, wanted a comparatively higher percentage of benefit shares to go to individuals. Here, however, people still desired that a major portion of biodiversity be conserved and used sustainably by the real custodians living near and within the rich biodiversity areas, and overall, they placed biodiversity conservation above economic gain.

Benefit sharing over the private knowledge and traditional practices

With regards to distribution patterns of benefit shares arising from private knowledge and practices, a great range of opinions was observed, varying with geographical location of the respondents (Table 2). The traditional knowledge holders from the remote villages have comparatively higher motives for desiring benefit shares from use of TK than the respondents from the transitional villages, in relation to conservation of natural resources from where they access a particular plant or product for medicine or other individual application. Most of these people (83%) indicated that the proportion of benefit share for the concerned community should be 25%, with 35% of the benefit share being apportioned for conserving the species involved (87% response). The remaining benefits, they decided, could be shared among an innovation promotion fund, the researcher who added value to the product, and institutional overheads and other such requirements. The knowledge holders from the transitional villages reflected a different approach. Eighty per cent of those interviewed wanted to direct 45% of the benefit share to the individual knowledge provider, with 20% each apportioned to the community and towards

conservation of biodiversity (70% and 79% of respondents, respectively).

The reasons mentioned by the TK holders of remote villages for awarding a higher percentage of the benefit share to the community and to conserving biodiversity were that this would significantly enrich the social systems and provide a sense of equitable rights to natural resources among the community members. It would also, they maintained, inculcate a sense of cooperation and moral rights among the members of the society through distribution of benefits from individual practices, which are directly or indirectly part of the whole community. The differences in opinion between these two types of communities with regards to benefit shares from individual traditional practices might be explained by the differences in geography and cultural ethics. In many cases, traditional knowledge holders living near areas high in biodiversity are poor in economic status but are rich in knowledge and social capital due to strong ethics and appreciation of the natural world. Whether a particular traditional practice is held in private or is in the public domain, is not as important as the social support system and cultural ethics, which have a strong influence on use of biodiversity and related benefit sharing. Similar findings have also been reported earlier^{2-5,21}.

Non-monetary benefits arising from use of traditional knowledge

On the matter of non-monetary benefit shares from traditional knowledge use, different male and female traditional knowledge holders agreed in some areas and differed in others. Most of the respondents irrespective of gender chose all the available options of non-monetary compensation (Table 3) relating to social and cultural recognition in the society. However, responses for different tribes and different genders varied in a more detailed analysis. In almost all of the tribes in the study, males indicated a greater

Table 2 — Benefit sharing of individual practices (modification in traditional or newly discovered)
(herbal, NRM practices, ethnic foods and agriculture)

Particulars	Transitional villages		Remote villages	
	Mean response of participants in %	Proportion of benefit out of 100	Mean response of participants in %	Proportion of benefit out of 100
Traditional knowledge holder	80.0	45.0	92.0	25.0
Community/village	70.0	20.0	83.0	25.0
Innovation promotion fund	95.0	5.0	76.0	10.0
Researchers who add value	81.0	5.0	88.0	3.0
Institutional overheads	87.0	5.0	91.0	2.0
Conservation of natural resources	79.0	20.0	87.0	35.0

Table 3 — Non-monetary benefit over the traditional practices

Particulars	<i>Monpa</i> tribe		<i>Khasi</i> tribe		<i>Adi</i> tribe	
	Male (60)	Female (60)	Male (60)	Female (60)	Male (60)	Female (60)
Honour in a public function at local, state or national level	67.0	59.5	75.0	70.0	80.0	67.0
Recognition in media	70.0	48.0	81.0	78.0	85.0	73.0
Recognition in text books in case of really unique distinction	79.5	68.5	87.0	90.0	87.0	81.0
Support for contacting other innovators/traditional knowledge holders	85.0	73.0	86.0	72.0	74.5	65.5
Linkage with R & D institutions for valorization of knowledge	70.0	55.0	75.0	67.0	81.5	68.4
Opportunity to share one's knowledge with others by different kinds of means	85.0	93.0	79.0	84.0	69.5	57.6
Support to the community to share the knowledge with other communities	87.0	94.0	68.0	70.0	73.7	65.8
Guidance form formal or informal sources to conserve the natural resources used in traditional knowledge	76.0	82.0	62.0	70.0	65.0	57.5
Supply of scientific information in local language about the herbal or other traditional knowledge	79.0	83.0	95.0	92.0	89.0	92.0

Note: Figures indicate responses percentage of traditional knowledge holders

Table 4 — Gender wise response for proportion of benefit sharing of community based practices (herbal, NRM practices, ethnic foods and agriculture)

Particulars	Male		Female	
	Mean response %	Proportion of benefit out of 100	Mean % response	Proportion of benefit out of 100
Traditional knowledge holder	82.00	40.00	89.00	25.00
Community/village	89.00	20.00	77.00	30.00
Innovation promotion fund	93.00	10.00	89.00	5.00
Researchers who add value	90.00	5.00	94.00	5.00
Institutional overheads	70.00	5.00	89.00	5.00
Conservation of natural resources	74.00	20.00	93.00	30.0

willingness to receive honours in a public function at local, state and national levels in recognition of their knowledge, while females were somewhat less interested in this type of recognition. Possibly this is due to the women's shy nature, and to male dominance in the case of the *Adi* and *Monpa* tribes. In the *Khasi* tribe, where a matriarchal system exists and decision making and most of the works relating to biodiversity are performed by women, 70% of the women knowledge holders were more amenable to receiving public honour and recognition for their knowledge. Except for a few non-materialistic incentives, women were behind the male TK holders in desire for receiving a share of benefits (Table 3). In contrast, in relation to knowledge networking, such as the opportunity to share one's knowledge with others and providing support to the community to share particular knowledge with other communities, women were more supportive than male (with responses of 93% and 94%, respectively). Even though in the *Monpa* and *Adi* tribes, women hold the greatest knowledge of livelihood practices and natural

resources management and are the main conservers and perpetrators of traditional values and indigenous biodiversity, because of the patriarchal system in these tribes, the women are not generally the main recipients of benefit shares arising from this knowledge and practice. Thus, ensuring the immediate and midterm non-monetary benefits arising from indigenous knowledge systems can benefit directly to the society concerned and can significantly make bonds for preserving the indigenous biodiversity and roots of knowledge systems^{4,25-27}

Gender and proportion of benefit sharing of community based practices

In many cases, the opinion and responses of females were quite different than those of males, particularly over benefit shares related to traditional practices associated with local plants used in medicines and ethnic foods (Table 4). The pooled response of both workshops and individual interviews revealed that majority of women folk (93%) believed that a major proportion (30%) of benefits arising from

traditional practices (i.e., herbal medicines, natural resources management practices, ethnic foods and agriculture) should be directed back towards conservation of indigenous biodiversity, natural resources and development. Furthermore, 77% of the women believed that a similar proportion (30%) of benefit shares should be given to the community as a whole. Eighty-nine per cent of the women considered that 25% of the benefits were sufficient for an individual's knowledge and practices for their creativity and efforts. In contrast, 82 % of the male respondents felt that a significantly higher proportion (40%) of benefits arising from any traditional practices may be given back to the individual traditional knowledge holders. In the case of communally held knowledge and practices, the appropriate benefit share for an individual, who modify the community practices thought by the male respondents to be 20% (89% response), and towards biodiversity conservation and natural resources management of the places from where the original plants and related products are accessed, 20% was seen as an appropriate allocation. For the other portions of benefit shares, including innovation promotion funds and expenses incurred by researchers in refining and validating the TK, both men and women were generally in agreement. From these observations it can be concluded that women are stronger custodians of natural resources, and they believe more strongly in biodiversity as a public domain, to be used as means of community survival and supporting cultural and ethnic viability. Accordingly, they believe, the benefit share should also be directed to maintain and preserve the harmony of nature and culture.

Types of benefits and customary norms of traditional knowledge holders

Attempt has been made to evaluate the customary and ethical dimensions of materialistic and non-materialistic benefits arising from traditional knowledge systems in order to assist in developing fair and ethical agreements. Table 5 presents agreement scores of traditional knowledge holders relating to different types of benefits, customary laws and ethical norms. Knowledge holders of the *Adi* tribe of Arunachal Pradesh were found to be higher with their mean agreement score (334.7) for both material and non-material benefits discussed, followed by the *Khasi* (332.1) and the *Monpa* (325.9) tribes. However differences in mean agreement scores were not statistically significant. These findings therefore point

to a general agreement among the TK holders irrespective of tribal community on appropriate types of benefit sharing related to indigenous practices. A larger sample size would be required to understand the particular differences or to interpret the implications of the findings.

Cultural ethics and benefit sharing arising from the traditional knowledge

The ethics have always played a significant role in valuing, protecting and sustainably using the biodiversity and natural resources⁵. In the study, the TK holders irrespective of age were highly ethical and altruistic, placing the potential benefits of their knowledge towards welfare of society in general, conservation of biodiversity, and access to commonly-held natural resources and natural area. The knowledge rich traditional holders living near dense forest areas were found to be more supportive of conservation of biodiversity and higher in their cultural ethics not only to share the benefits, but also in accessing indigenous biodiversity to promote sustainability. So, a subjective correlation between level of cultural ethics and benefit shares arising from TK were found to be a situational factor, affected by types of biodiversity users and their socio-cultural dimensions. Some knowledge holders (40% male and 28.4% female) felt that their knowledge of various plants, both wild and cultivated, which has developed over many generations, should not be commercialized by the present generation, for them to reap all the rewards from it. They felt, rather, that the older knowledge holders, who were found to be less cosmopolitan in the modern world, should be recognized for their contributions in conservation and value addition to indigenous biodiversity. The TK holders living in far-flung areas and in fragile ecosystems were found to be more cautious in terms of protecting their means of survival rather than desiring the economic incentives arising from use of their knowledge of indigenous biodiversity. Their approach was very rational; they environmental adopted the ancestral knowledge of considering the different bio-meteorological parameters in order make decisions on the right time and right level for accessing indigenous biodiversity.

As one of the *Gaon Burha* of Dirang, Mr Lobsang, along with Mr Tashi Norbu, commented regarding cultural ethics and use, conservation and sustainability of natural resources: The plant, *nying*, trees – *paisang* and *minangmose* (*Gymnocladus assamica*), wild animals–beer and deer, rangelands–grasses, fruits and

Table 5 — The agreement score of traditional knowledge holders towards types of benefits, customary laws and ethical norms

Particulars	Agreement score		
	Monpa tribe (120)	Khasi tribe (120)	Adi tribe (120)
Scientific work based on traditional knowledge systems and biodiversity should be shared back with its knowledge holders	350.0	275.0	265.0
The prior permission of local community should be taken by the professionals like germplasm collectors and ethnobiologists before starting any research work	340.0	337.0	378.0
Developing the capacity of traditional knowledge holders leads to use the local knowledge in improving for better economic status	350.0	349.0	325.0
The well trained traditional knowledge holders through the research may sustain more and can use the local biodiversity for better income	277.0	298.5	345.0
The traditional knowledge holders may be given the legal authority to enter into the managed resources protected areas for judicious use and access of biodiversity for survival	310.0	298.0	332.0
The monitory benefits arises from community knowledge may be given to the community trust/tribal council/customary council instead of formal Panchayat body	290.0	345.0	350.0
Before any formal use of traditional knowledge, assurance of knowledge networks may be established for updating and sharing the knowledge for well being	267.0	290.0	333.0
An union of sustainable harvesters and users of local biodiversity may be established for the long term knowledge network and meet out the common interests	310.0	343.0	298.0
The knowledge of endangered species and its use for improving the life of human being should not be publicly opened for the commercial use	345.0	355.0	330.0
The authority of an imposed tribal council if is in conflict with elders and traditionalists the appeal should often be made to abide by customary law in obtaining the consent	280.0	310.0	343.0
The knowledge of many biological resources is customarily held by the group and accordingly the consent may be taken	350.0	354.0	356.0
The knowledge owned by whole community through the customarily come from a particular segment of a peoples or local community and the PIC must be taken accordingly	345.0	321.0	336.0
PIC obtained through the signing of a contract must continually be renewed	356.0	346.0	333.0
Intent of parties should clearly be known in advance and specified at the time of signing a contract or other instrument	351.0	357.0	357.0
Erosion of local knowledge is increasing due to its valorization are unfounded	298.0	345.0	315.0
The knowledge must be held in common domain and should not be allowed to be monopolized by private sectors	343.0	350.0	356.0
Lack of materialistic incentives for conservation of endangered species is one of the important factors in increasing the erosion of biodiversity and associated knowledge systems	348.0	355.0	352.0
Erosion of oral traditional knowledge and continued unwillingness of younger generation to learn the knowledge can be enhanced by various educational ways and related incentives	356.0	349.0	320.0
Mean	325.89	332.06	334.67
SD	31.09	26.21	25.35
CV (%)	9.54	7.89	7.58
Z values:			
The z value for significance difference in the agreement between Monpa and Khasi tribes is 0.45, NS			
The z value for significance difference in agreement between Monpa and Adi tribes is 0.65, NS			
The z value for significance difference in agreement between Khasi and Adi tribes is 0.24, NS			

spices – *ambre* (*Diosphyus* sp.), walnut and *timbur* – and star-anise and many more other wild plant-based products were used since time immemorial by our elder people to cope up with many human and animals diseases, for meeting religious and cultural demand and ensuring the food security in harsh ecosystems without any loss and threat to their sustainability. But now these plants have become question of conservation. Forest and other conservation agencies are keeping our local natural resources protected and we are increasingly been

prohibited to access it. Why this is? If over long time these resources have been explored and used by our forefathers for survival, now why the outside agencies are depriving us from them? Who is to be accused for depletion of our indigenous natural resources? Our community? The new cultural changes in our modern generation? Or some other external economic and socio-political factors? During last 30-40 yrs, the major factors behind erosion of indigenous flora and fauna species are the cultural erosion among the new generation caused by the market based economy and



Fig.1 A group of TK holders



Fig.2 A group of Khasi TK holders



Fig.3 A group of TK holders of Monpa tribe



Fig.4 A diverse group of Khasi tribe



Fig.5 Chief community leader



Fig.6 Mr. Tashi Norbu and his wife Mrs P. Dolma

materialistic culture. Everybody wants to become rich instantly overnight. To meet the expanses of modern lifestyle they do extensive cutting and deforestation for commercial fruits orchards.

Thus, it is obvious that the cultural ethics of the indigenous people as conservators have played a significant role not only in the judicious use and conservation of biodiversity, but also in maintaining their sustainable livelihood and harmony with nature. These conservators of biodiversity must be acknowledged and rewarded for their outstanding contribution (Figs. 5 & 6). The role of judicious use of a particular indigenous resource governed by the high cultural and ethical values of indigenous peoples of different communities has been pointed out²⁹. Such instances of cultural and ethical values of biodiversity conservation and benefit of TK has later been become the subject of debate among different categories of TK holders. A majority of old age respondents (72.56%), irrespective of tribes and gender, has indicated that they want more non-materialistic incentives, followed by indirect materialistic incentives. With regards to indirect materialistic incentives, the Government can give them time-bound-license based permission to enter into the reserve areas so that they can interact with nature, learn and explore some additional indigenous practices to generate a means for better survival and

welfare of humankind. Some of the knowledge holders (35.46%) have raised the question of why Governments should be entitled to reap any benefit(s) from commercialization of any patented indigenous products when the resource and the knowledge about it were actually provided by individuals or communities? This issue needs point to be pondered by the policy makers, stakeholders and agencies involved in patenting and providing benefits from indigenous knowledge systems.

Pervious studies have shown that biodiversity cannot be conserved by keeping people poor. In the cases where biodiversity has survived under conditions of poverty, the communities involved conserved diversity not because of poverty but because of their superior ethical values. This has happened when many traditional healers refuse to demand or accept any compensation or payment provided for their services to individuals in inter and intra-communal systems^{5,27-29}. Instead of random collection and screening of local plants, it is a more rational and effective strategy for agencies to use indigenous knowledge as a lead to pinpoint promising plants for new medicines. The difference between a market and materialistic economy based on individual ownership, and a communal economy which uniquely shares its indigenous biological and cultural resources internally among the members, means that the cultural

group as a whole that nurtures the knowledge systems must benefit equitably and communally²³⁻²⁵.

Conclusion

It can be concluded that economic development in many regions has often been accompanied by a decline in biodiversity as assessed by the local people. Furthermore, the distribution of the gains and benefits among different stakeholders generated through added value and economic applications of TK obviously needs immediate attention of the institutions concerned². It is increasingly being realized that the role of non-monetary incentives to acknowledge the source of TK may sometimes be more important than economic incentives and rewards⁵. Not all traditional practices may be considered as available for disclosure for PIC and IPR. A certain scale to qualify the outstanding standard of IPR must be made clear at the time of taking PIC. Even traditional knowledge itself should receive a certain kind of protection if incentives have to be generated to conserve not only the knowledge but also the institutions supporting its reproduction and inter-generational transfer^{2,4}. The norm for acknowledgement of local knowledge has not become of professional value among the professionals and scientists, yet the majority of TK holders perceive that today it is needed to acknowledge their wisdom. A rational combination of monetary and non-monetary incentives would be the optimal for a particular kind of knowledge system under institutional arrangements that can be made clear in the PIC itself. Fears that the erosion of local knowledge will increase due to its valorization are unfounded and a dearth of information on experiments around benefit sharing is lacking. More PIC studies in this regard can generate a clearer picture at the national level. The local communities and traditional knowledge holders in the study were in agreement that their community/private knowledge must be kept in the common/private domain and should be protected from private sector monopoly. Thus, ensuring the immediate and midterm non-monetary benefits arising from indigenous knowledge systems can benefit directly the society concerned and can have a better chance of preserving indigenous biodiversity and the roots of knowledge systems.

Lessons taken from the study proved that organizing village workshops through outstanding TK holders and local wisemen could provide an environment to develop the inter-communal and intra-

communal knowledge networks of local human healings, animals healing, agricultural, natural resources and ethnic foods' practices. Developing the vertical learning network of TK holders with education system and permitting them for lecturing in schools and concerned public forum may act as good non-materialistic incentives to preserve and diffuse the indigenous knowledge systems from one generation to another. It has been observed in many parts of our country that customary law is closely linked to traditional biodiversity access and resource management systems, especially in Northeast India. Still the customary law of tribal people are recognized as authentic source and used for processing the concerned problems related to biodiversity and natural resources. So the rights over both biological and genetic resources are subject to customary law rights, which also must be made clear at the time of taking PIC so that in future there should not be any conflict between formal and informal constitutions and its effect on the rightful benefits to the traditional knowledge holders²⁷⁻²⁹.

The situations like geographical locations, socio-cultural backgrounds and the exposure to the modern materialistic world are such factors, which decide the ethics and level of motives of TK holders regarding the benefits share from local knowledge. The publication of local knowledge exhausts IPRs on one hand and may deprive the knowledge provider any benefit that arise from value addition in local knowledge to the individual or community or nation concerned., but at the same time, publications in local language make it possible for people struggling with similar problem to learn from it³⁻⁵. Every applicant related TK should be required to disclose that material, information or any other knowledge used in the patent application that has been obtained lawfully and rightfully via PIC. Indeed, it will not only facilitate the equitable benefit sharing but also maintain transparency of *Sui generis* system under which the indigenous genetic materials are to be transferred by the TK holders to the willing parties¹². There is a tremendous amount of indigenous knowledge in the Northeastern India, which is available only in oral form and codified in the local language among the communities and has not yet been capitalized properly. There have been instances when such knowledge communicated in good faith by local people has been used without acknowledgement or reciprocity to claim intellectual property, which is a matter of serious concern.

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