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Traditional knowledge systems in India for biodiversity conservation

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The term 'Traditional Knowledge' (TK), also used reciprocally with indigenous knowledge, is used to describe any indigenous knowledge, innovation, or custom, tradition of local communities that is important in protection, conservation and sustainable use of biodiversity and various traditions. TK is vital to the food security and health of millions of people and is developed and passed on from generation to generation in the form of accounts, songs, cultural values, local languages, customs and customary practices, healing arts, and agricultural practices, for the collective good of the communities. It closely interlinks cultural and biological diversity, forming an essential basis for the conservation and sustainable use of global biodiversity. Also within the framework of the Convention on Biological Diversity (CBD), the contracting States have undertaken to respect and promote TK and to make it locally accessible. This paper entails information related to various initiatives, programs, plans and India's progress towards Aichi Biodiversity Target 18 of the Strategic Plan of Biodiversity 2020 and discusses meaningful integration of TK of indigenous and local communities into Biodiversity Conservation. The details were compiled by undertaking an extensive review of the literature, scientific papers, reports and articles. The presented information was collected as part of the preparation of the India's Fifth National Report (NR5) to the CBD.

Keywords: Biodiversity, Convention on Biological Diversity, Aichi Biodiversity Target, Traditional knowledge, Traditional practices

IPC Int. Cl.⁸: G01S 3/72, G01S 7/42, G06F 19/10, A61K 36/00

The term 'Traditional Knowledge' (TK) interchangeably used as indigenous knowledge (IK) is used to describe any information, knowledge, innovation, or practices of the indigenous local communities that is of relevance in ensuring the conservation and sustainable use of biodiversity^{1,2}. It encompasses all species of plants, animals and micro-organisms and variations between them, which form an intangible component of the ecosystems of which they are part^{3,4,5}. Such a knowledge is developed and passed on from generation to generation in the form of stories, songs, cultural values, traditional laws, local languages, rituals, healing arts, and agricultural practices, for the collective good of the communities^{6,7}. Traditional Knowledge (TK) or Traditional Ecological Knowledge (TEK) is important not just for its own sake but for its potential to help design more effective conservation of biodiversity and for ecological systems in general through the knowledge possessed

by a group or individual about an environment⁶. It is an outcome from having lived in and observed an environment for generations and is developed from experience acquired over time and across generations⁷. Groups like hunters, gatherers, agriculturists, herders possess such knowledge^{6,7}. Such knowledge is often adapted to a local culture and environment and plays a significant role in the daily lives of the majority of people nationally as well as globally and is considered to be an essential part of cultural identities^{6,8,9}. These traditional communities and indigenous peoples often have a profound understanding of their environment and its ecology, forming a substantial basis for the conservation and for sustainable use of global biodiversity, closely interlinked to cultural and biological diversity⁴.

In many developing and least developed countries, TK is vital to food security^{10,11} and caters to the health of millions of people, by providing the only affordable treatment available to poor people. For example, an ethnobotanical survey of a tribal area in Malkangiri district of Orissa¹², revealed that 34 plant

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species are used by tribal people in their day to day life¹². Thus, it would be appropriate to state that, all knowledge and wisdom ultimately flow from practices, but their organization and management differs from the different streams of knowledge, one such example being, the folk knowledge¹³. It is preserved; passed, and improved almost entirely in the course of applying it in practice, and, therefore, is highly sensitive to changing relationships between people and their ecological resource base^{13,14}. Such a knowledge, practices and innovations are disintegrating at a rapid pace for two reasons: firstly, reduced dependence of local population on endemic medicinal plants and animals as before, since modern and newer resources have replaced the local use; and secondly, declining control over the local resource base, which is being used and captured by the State and the Corporates, and used for their own interest^{15,16}. However, recognizing the importance of TK, the United Nations (UN) Conference on Environment and Development in Rio de Janeiro in 1992 marked the first occasion on which the value of TK was accorded broad recognition. Also within the framework of the CBD, the contracting States should undertake to respect and promote TK and to make it generally accessible⁹, where access to such indigenous knowledge should be based on the consent of the holders of the knowledge and their equitable participation in the benefits that result from the use of their knowledge^{17,18,19}.

Recognising the substance value of TK, innovations and practices of indigenous and local communities, the CBD through the Strategic Plan (SP) for Biodiversity 2011-2020, adopted 20 Global Aichi Biodiversity Targets in 2010 at Japan of which one target is dedicated specifically to TK and its conservation. The Aichi Biodiversity Targets are split into five Strategic Goals, where *Strategic Goal E* sheds light on enhancing implementation through participatory planning, knowledge management and capacity building (www.cbd.int). The Strategic Goal E contains four Aichi Biodiversity Targets. Out of those four, Aichi Biodiversity Target 18, aims at the preservation and conservation of the TK, innovations and practices of indigenous and local communities. The target states 'By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to

national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels'. The target is intended to fulfill two fundamental objectives of the Convention; (i) Article 8j, promoting parties to respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices; and (ii) Article 15, which aims at sharing, in a fair and equitable manner the results of research and development and the benefits arising from the commercial and other utilization of genetic resources (<http://www.cbd.int/traditional>). Issues relating to the protection of TK, though quite complex, are of particular interest to India. Several attempts have been made for the protection of TK in the country. The current paper captures an array of diverse initiatives that aim to record traditional use of biological resources, plans and programs related to India's progress towards Aichi Biodiversity Target 18 of the SP for Biodiversity 2011-2020, for moving towards the goal of promoting a meaningful integration of TK of indigenous and local communities into biodiversity conservation.

Methodology

Extensive literature review was performed in both peer-reviewed and grey literature, by gathering information on various plans, programs and national initiatives in the direction of promoting and preserving India's TK in relation to biodiversity conservation. Prior to beginning the comprehensive literature search, a brief initial study of the literature was conducted in order to develop key search term list. This preliminary review started with a Google search of the primary overarching terms, such as, traditional knowledge, traditional Indian knowledge, indigenous knowledge practices, access and benefit sharing (ABS). The initial documents and all terms indicating traditional knowledge or indigenous knowledge were reviewed and noted in a keywords list. Thereafter, an extensive literature review between April 2013 and December 2013, using two main search engines, Google Scholar and Google, was

conducted. Google Scholar was used to search for peer-reviewed papers that discussed the TK concept, or which provided data in the form of reports, plans, and activities on TK practices in India. On the other side, Google engine was used to search for grey literature, including NGO reports and plans on TK value, as well as latest news articles and publications that covered TK concepts. Since these keywords and phrases generated hundreds and even thousands of results, our Google and Google Scholar searches were limited to the first two pages of each search. The relevant papers were defined as any paper that contained one or more of the pre-determined TK related activities, plans, practices, both quantitatively and qualitatively.

Material related to local knowledge or TK leading to biodiversity conservation was shared by more than 30 individuals, and 18 organizations (Government and Non-government). The information was assembled after going through 18 technical reports from various organizations, 11 peer reviewed papers, Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India (GoI), official correspondences for extracting relevant information; and an extensive web search was carried out. Pertinent information was also obtained from the CBD division of MoEFCC. The Ministry of Health and Family Welfare (MoHFW), (GoI), also immensely helped in arranging and sorting information related to the national initiative in light of TK protection. The information was collected as part of the preparation of the India's NR5 to the CBD. A national stakeholder consultation for the preparation of NR5 was held, where a total of 135 participants from various Government, NGOs, corporate bodies, scientific institutions and Ministries of GoI, participated and shared topic-specific information. The data and information presented in the paper were validated rigorously through efforts on a national scale.

National initiatives in preserving TK

India is rich in TK associated with biological resources. This TK is both coded and non-coded as in the texts of Indian medicine systems such as Ayurveda, Unani and Siddha; and in the oral undocumented traditions. To deal with this system, MoHFW, has a separate department, AYUSH, (elevated to an independent Ministry in November, 2014) that deals with developing and propagating officially recognized ancient and holistic systems

namely, Ayurveda, Yoga, Naturopathy, Unani, Siddha and Homeopathy (i.e., AYUSH) which have been making significant contributions towards the healthcare of the people^{20,21}, (www.indianmedicine.nic.in). As on date, 6560 species of Indian medicinal plants have been recorded from these codified systems as well as folk traditions²² of health practices across 4635 ethnic communities of the country (www.nbaindia.org). Through AYUSH, the National Medicinal Plants Board (NMPB) has provided support to 39 projects involved with cultivation of medicinal plants, 86 projects relating to storage godowns; and Joint Forest Management Committees for conservation of medicinal plants on 26,158 h of land; and to setting up 3,123 school/home herbal gardens^{20,23}. One of the new initiatives of AYUSH in the 12th Five Year Plan (2012-2017) includes the NMPB. The scheme is primarily aimed at supporting market-driven medicinal plant cultivation on private lands. It has helped set up 636 nurseries of medicinal plants, bring 51,308 h of land under medicinal plant cultivation, and provided support to 25 post-harvest infrastructure units (nbaindia.org/uploaded/Biodiversityindia/3rd_report.pdf).

Among important initiatives to document renewable resources of the country including the rich biodiversity of plant and animal species as also the mineral wealth abounding in the Indian subcontinent, the National Institute of Science Communication and Information Resources (NISCAIR), a part of the Council of Scientific and Industrial Research (CSIR; www.csirhrdg.res.in) has prepared 'The Wealth of India' series, an encyclopedia series with a correct identity of each plant, its distribution in the wild or occurrence as cultivated plants in India, and the parts of economic importance have been adequately described²⁴.

The All India Coordinated Research Project on Ethnobiology, of the MoEFCC launched in 1982 has helped unearth a large spectrum of uses that tribal populations of the country make from plants and animals. The project has recorded use of over 10,000 wild plants known to tribals for varied purposes from across the country.

Botanical Survey of India (BSI; www.envfor.nic.in) and Zoological Survey of India (ZSI; www.zsi.gov.in), are the responsible agencies for the survey and inventorization of flora and fauna of the country. The BSI and the ZSI through field survey have covered about 70% of the territory of India and have published

over the years, documents on plants and animals at all levels in the country, and, in some cases, even at the district level, with information from a few chosen ecosystems. The surveys have also been published as Red Data Books on Endangered species (<http://envfor.nic.in/report/0203/chap-02.htm>).

The Bio-Diversity (BD) Act, 2002, which is the parent legislation in this domain, was drafted mainly to implement India's obligations under the CBD. The primary aim of the legislation can be ascertained from the Preamble of the legislation, which states to provide for conservation, sustainable utilization and equitable sharing of benefits arising out of utilization of genetic resources and also to give effect to the said Convention²⁵. As envisaged, the BD Act, 2002 provides for setting up of Biodiversity Management Committees (BMCs) in accordance with Section 41 (www.nbaindia.org). The functions of BMCs according to the BD Act, 2002, are to prepare, maintain and validate People's Biodiversity Register (PBR) in consultation with the local population. PBRs document information on innovations, traditions, folk ecological knowledge and practices using natural resources with the help of local institutions/organization and NGOs working in collaboration with grass-root level decentralized institutions of governance. These PBRs help in promoting sustainable resource management, and in ensuring equal division of monetary benefits to the local communities, for using their living resources. The program also attempts to promote folk ecological knowledge and insights in two ways: by developing more arranged means for their maintenance and by creating new contexts for their continued practice.

A total of 1901 PBRs in 14 States has been prepared in a phased manner. In addition, details of biological resources and TK available within the jurisdiction of BMC are maintained in a register and also advice on any matter referred to it by the State Biodiversity Board (SBB) or the National Biodiversity Authority (NBA) for granting approval, to maintain data about the local *Vaids* and practitioners using the biological resources and ensuring involvement of local community in decision making relating to ABS²⁶ (www.cbd.int/abs). So far, a total of 32,210 BMCs have been formed by local bodies in 23 States (www.nbaindia.org).

The BD Act, 2002, also governs the ABS by a three tier system involving NBA, SBBs and BMCs. In this respect, India played a leading role in the

negotiations for Nagoya Protocol on ABS as the President of Conference of Parties (CoP) to the CBD. India signed the Nagoya Protocol on 11th May 2011, and ratified it on 9th October 2012, and has a domestic legislation on ABS, under the Act. Among the 20 Aichi Biodiversity Targets, Target 16 deals with Nagoya Protocol and states 'By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation'. India has been working in this direction with the CBD Secretariat and other Parties to expedite ratifications of this significant international agreement, with a view to ensure its early entry into force. In the twelfth meeting of the CoP to the CBD, in Pyeongchang, Republic of Korea, 2014, Nagoya Protocol on ABS entered into force. It got the expected requisite number of ratifications to be operational. With this, Aichi Biodiversity Target 16 became the first target to be achieved by India through this Act²³.

In order to further strengthen the process for the protection of plant varieties, rights of the farmers, for their functioning in conserving, improving and making available plant genetic resources, has been considered necessary to recognize²⁷. Thus, the Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act 2001, has been enacted in India, to protect plants breeders' rights. Every year, PPV&FR Authority, a statutory body under the Ministry of Agriculture, invites applications for the Plant Genome Savior 'Farmer Reward' & 'Farmer Recognition' from the farmers involved in the conservation of genetic resources of wild relatives and landraces of economically important plants through selection and preservation²⁷. The material selected and preserved has been used as donors of the gene in varieties registerable under the PPV&FR Act, 2001. Another subsystem of biological diversity governed by CBD and BD Act 2002, as mentioned in the PPV&FR Act, constituents of Agro-biodiversity, which includes (i) Genetic diversity of cultivated plants and farmed and domesticated animals and their wild relatives, (ii) Non- harvested species, *viz.* microorganisms, insect pollinators, etc. (iii) Other socio-economically as well as culturally valuable species for food production ecosystem²⁸. A Task Force set up by PPV&FR Authority on 8th October, 2007 to further identify agro-biodiversity hotspots, document endangered and economically important species

for sustainable agriculture, revised the list of 17 agro-biodiversity hotspots to 22 agro-biodiversity hotspots in Indi²⁸.

The Patent Act, 1970, provides for mandatory disclosure of source and geographical origin of the biological material in the specifications when used for an invention. Non-disclosure or wrongful disclosure of the source of biological material and any associated knowledge results in refusal of the grant of patent or revocation of the patent.

The Traditional Knowledge Digital Library (TKDL) is a collaborative project between the CSIR, Ministry of Science and Technology, and Department of Ayurveda, MoHFW (www.tkdil.res.in). TKDL database is a value added digital database developed by the GoI for (i) preservation of TK; (ii) prevention of misuse of TK by breaking the language and format barriers of TK systems, and providing access to these knowledge systems to patent examiner(s) in 5 international languages, i.e., English, German, French, Spanish and Japanese, for establishing the prior art; and (iii) to build active research using modern science; and initiate projects helping discover new drugs and their development, leading to inexpensive healthcare for the poor in the country (www.tkdil.res.in). The TKDL database has been created to prevent misappropriation of TK at the International Patent Offices so that cases of bio-piracy can be avoided. India has already signed TKDL Access Agreement with (i) European Patent Office (February 2009), (ii) United State Patent & Trademark Office (November 2009), (iii) Canadian Intellectual Property Office (September 2010), (iv) German Patent Office (October 2009), (v) United Kingdom Patent & Trademark Office (February 2010) and (vi) Intellectual Property, Australia (January 2011). Meanwhile, negotiations are under way to conclude the Access Agreement with the Intellectual Property Office of New Zealand. TKDL in the country have led to considerable march towards preventing misappropriation of Indian TK²³. To promote traditional practices and value systems in the conservation of biodiversity rich area, the MoEFCC, assisted by other organizations, is helping in the maintenance of the vast number of sacred groves across the country²³. Indira Gandhi Rashtriya Manav Sagrahalaya (IGRMS), Bhopal, launched an initiative relating to sacred groves in 1999, in which *in-situ* and *ex-situ* conservation of sacred groves in different parts of the country was undertaken. Replicas of

80 different types of sacred groves have been established on the IGRMS campus. Applied Environmental Research Foundation, involved in the restoration of sacred groves in the northern Western Ghats, has prioritized 20 sacred groves in urgent need of conservation and restoration. CPR Environmental Education Centre (CPREEC), an Environmental Information System (ENVIS) centre on Conservation of Ecological Heritage and Sacred Sites of India, works towards restoration and conservation of sacred groves across the country. CPREEC has successfully restored 52 sacred groves in the States of Tamil Nadu, Andhra Pradesh and Karnataka (http://cpreecec.org/eco_news_oct_dec10.pdf). To strengthen the information database for Sacred Groves, the Sacred Grove Information System (SGIS) has been developed by National Chemical Laboratory (NCL), Pune. It includes type and nature of information, information sources, validity and authenticity of the information. Information is being collected from published literature and through different personal communications. Currently, brief information on 3,000 sacred groves from Andhra Pradesh, Maharashtra and Tamil Nadu, is held by SGIS^{29,30}.

India is not only supporting initiatives for the protection of TK and ABS but is also engaged in the advocacy and training of TK, since 1950. For example, in the health sector, India has established more than 300 Graduate and Post-graduate colleges of traditional medicine and has given traditional systems of medicine a legal status in its national health programs. In the National Health Policy, 2002, the GoI has identified revitalization of local (village-based) health traditions as an important thrust area. Households and local healers provide knowledge which is used in a shared manner. Those records are kept for future generations use and from protecting TK from bio-processing by local healer associations³¹.

Foundation for Revitalisation of Local Health Traditions (FRLHT) Bengaluru, is the Center of Excellence for Medicinal Plants and TK (www.envis.frlht.org, www.iaim.edu.in), recognised by the MoEFCC. It has undertaken significant activities that contribute towards Aichi Biodiversity Target 18 and India's National Biodiversity Target 11 (www.cbd.int/abs). For example, it has developed the raw drug repository, which specializes in the collection of plant raw drugs used in Indian systems of medicine. It has also developed the ethno medicinal

garden, which houses different medicinal plants used in the traditional systems of medicine. These are planted in various assemblages, each representing a definite theme or usage group. One of FRLHT's activities is aimed at distribution mapping using Geographical Information System (GIS) and identification issues of traded medicinal plants. The Geographical Distribution Atlas incorporates geographical distribution maps for 1670 species (2243 botanical names) and Eco-distribution maps for 180 prioritized species. The Medicinal Plant Conservation Areas (MCPAs) in India, is a unique and pioneering programs for the conservation of wild medicinal plants, initiated in the year 1993. The network helps in conservation of prioritized wild medicinal plants found in different regions of the country³². Till date, a total of 108 such MCPAs have been established across 12 States (www.envis.frlht.org).

For recognizing, respecting and rewarding innovations of outstanding TK at the grassroots level, National Innovation Foundation (NIF), an autonomous society, was established under the Department of Science and Technology in 2000. SRISTI, an NGO involved in this work, is managed by the Indian Institute of Management, Ahmedabad, through its Honey Bee Network³³. It scouts for local innovations to document the local traditional knowledge. As of today, NIF has scouted the mark of 100,000 ideas, innovations and traditional practices from over 545 districts³⁴.

The country is also supporting significant projects such as the 'Globally Significant Medicinal Plants (GSMPs) in India', which is a Global Environment Facility (GEF) Project (www.undp.org). This project is supported by the MoEFCC. It seeks to promote long-term conservation and sustainable use of India's medicinal plants through forest management policy and practices at the national, state and local levels. It is currently being implemented in three States *viz.*, Arunachal Pradesh, Chhattisgarh, and Uttarakhand. The project has been able to mainstream medicinal plants in strategy and protocol and promote the preservation of TK through PBRs and ABS³¹.

An initiative launched by the Food and Agriculture Organisation (FAO) of the UN in 2002, Globally Important Agricultural Heritage Systems (GIAHS), to recognize, conserve and manage best agricultural biodiversity knowledge systems, food and livelihood security and cultures throughout the world, has as

many as 100 to 150 sites worldwide, which are protected and managed for their TK. Currently in India, three sites come under GIAHS *viz.* Saffron Heritage of Kashmir, 2011; Koraput Traditional Agriculture, Odisha, 2012 and Kuttanad Below Sea Level Farming System, Kerala, 2013. Another 6 potential sites have been identified to be brought under the purview of GIAHS³⁵ (<http://www.fao.org/giahs/giahs-sites/asia-and-the-pacific/en/>).

For effective and expeditious disposal of cases relating to environmental safeguard and protection of forests and other natural resources, the National Green Tribunal (NGT), was established under the NGT Act, 2010. It encompasses enforcement of any legal rights relating to the environment, and giving respite and compensation for damages to persons and property and for matters connected therewith or incidental thereto (www.wwfindia.org). It also caters to redressal of grievances and swift disposal of cases related to TK and customary use of biological resources. Since its inception in October 2010, the Tribunal has been successfully operating as a fast-track Court leading to efficient and quick clearance of cases relating to environmental protection and conservation. One hundred and thirteen cases have been adjudicated by NGT until March 2014 (www.wwfindia.org).

TK has received increasing attention on the international forums over the past decade. The CBD, World Intellectual Property Organization (WIPO), the International Labour Organization (ILO), FAO, the World Health Organization (WHO), the UN Educational, Scientific and Cultural Organization (UNESCO) and the UN Commission on Human Rights, have been active members in tackling issues related to TK and ABS. The factors contributing to this include, providing identification of TK's importance in the conservation of biodiversity and human well-being; helping in survival of the majority of the world's population; alarming loss of the TK and global cultural diversity; unconstitutional use of TK and improper patenting, and use of TK with little or no sharing of resulting benefits with the original holders of TK; connecting interest in binding the prospective use of TK for local sustainable development; and helping increasing awareness to indigenous rights³⁶. Plans and activities being discussed at many forums and organized at various levels to help resolve the intricate and varied issues pertaining to TK and its allied practices are gaining momentum

as the diverse tangible and intangible values that have been passed down from one generation to another are being increasingly recognised.

WIPO, one of the specialized agencies of the UN, promotes innovation and creativity for economic, social and cultural development of all countries, through a balanced and effectual international intellectual property system (www.wipo.int). India became a member of WIPO in 1975. The organization helps India develop the international legal Intellectual Property (IP) framework in line with society's evolving needs and facilitates collaborative networks and technical platforms for sharing knowledge and simplifying IP transactions, including free databases and tools for exchanging information.

In the year 1999, India in compliance with its obligation under the Trade Related Aspects of Intellectual Property Rights (TRIPS), enacted the Geographical Indications (GI) of Goods (Registration and Protection) Act, 1999. Geographical Indications are an IP tool for intensifying the relation between product quality and the geographic region of its origin and thus protect the rights of traditional communities and their TK. Registration of a GI gives its owner(s) and the authorised users the exclusive right to use the indications on the good in which it is registered. A violation can be caused by the use of the GI on such goods which indicate that such products originate in such place other than its true place of origin or due to unfair competition. However, there is no obligation under the agreement under Article 22 of the TRIPS Agreement on for other countries to extend reciprocal protection (www.ipos.gov.sg).

Discussion

The paper highlights importance of the national initiatives, plans and programs which provide an insight into understanding the documentation and application of TK across the country. The activities and plans feature integration at the national and regional level for strengthening countrywide collaboration, interpreting policies, and mediating interventions across borders. The above-illustrated activities and plans enlighten India's extensive efforts in preserving the traditional and folk knowledge. However, to link the sustainability of TEK to the environment, an amalgamation of the acquired knowledge and findings to socio-ecological systems are needed^{37,38,39,40}. In order to establish that link, sources of information, from a wider range of

stakeholders could be used alternately to the system based on conventional resource management. The information obtained from the acquired knowledge would therefore assist in understanding the diversity of locally evolved traditional systems and their drift for improved conservation and associated activities⁴¹. The massive TK database India currently holds, if managed well, should help examine, construe, and answer, dynamic changes in ecosystems and the resources and services that they generate. However, then, task for our TK managers would be to explore and highlight the role of local or indigenous communities in using TK; managing processes and functions of complex ecological systems; categorising practices on which people depend on; and secure a flow of natural resources and ecological services for future generations^{7,42}. In this way, the local communities would not only gather, allocate, and supply their knowledge, locally, but would also get to trade with other regional communities^{43,44}. In such a case, the traditional communities would be able to take advantage of property and access rights relating to land, natural resources and IP, both nationally and internationally^{43,44}. In this view, the CBD forum is also making great efforts in developing measures for the use and protection of TK related to the conservation and sustainable use of biodiversity. Frequent meetings and workshops are held with the Party members to answer questions about TK and its related issues, and evolve in its conservation domains with experiences gained over time.

India with a rich TK base needs to extensively understand scope of TK, particularly in the areas of agriculture and medicine; and find resolution for, preserving and protecting TK; and harnessing it for development and trade to benefit the TK-holding communities and countries. However, it should be noted that TK and its related concerns and objectives are unique to each country and community; therefore, solutions must also be customized to the local scope, to achieve success⁴⁵. In order to accomplish this on a larger scale, a multi-stakeholder dialogue with the full participation of TK holders, and planned processes to embrace a broad-based sense of ownership is needed. Evaluating the system for the qualitative and quantitative factors to be able to integrate management of resources and ecosystems, for efficient management, should also be considered, so that societies could act on their local knowledge and use it to produce a livelihood from the

environment⁴⁵. Hence, reviewing nature of the Aichi Biodiversity Target 18 and India's National Biodiversity Target 11(www.cbd.int), which addresses the issues ranging from importance of TK for communities, its protection, for development and ensuring equitable distribution of economic benefits, is of paramount interest.

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