Journal of Traditional and Folk Practices
Volume 04(2), December 2016, 25 - 34.
ISSN 2278 - 5906

ABS- Unlocking the opportunities

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Received : 18 Aug 2016 Accepted: 20 Oct 2016

Abstract

Access and Benefit Sharing (ABS) deals with the sharing of benefits arising from the utilization of genetic resources in a fair and equitable way. International Convention on Biological Diversity (CBD) recognizes the rights of countries, through their national governments and has put forth a set of rules and principles governing the use of genetic resources and associated traditional knowledge. In India, the Biological Diversity Act, 2002 and Rules, 2004 governs the access to various biological resources and sharing the benefits accrued. The present paper discusses on various international policies related to ABS, resource mobilization and conservation of bioresearches, operationalization mechanism of ABS, etc. The paper also focuses on role of Biodiversity Management Committees (BMCs) on various aspects of Benefit Sharing, development of sustainable livelihood approach, etc.

Keywords: - Access and Benefit Sharing, Biological Diversity Act, 2002 and Rules, 2004, Biodiversity Management Committees

Introduction

The Biological Diversity Act, 2002 and Rules, 2004 by Government of India are landmark legislations, which provide for regulated access to bio resources for commercial utilization or for bio-survey and bio-utilization (Biological Diversity Act, 2002 & Rules, 2004). The providers of biological resources are also the agents of value addition to the resources, as they are involved in the development and marketing of the final 'bio'-product for consumption (Suneetha and Pisupati, 2009). Hence, it is elementary that any profit accrued from commercial utilization should benefit the local community also. The regulations for Access to bio-resources and Benefit Sharing (ABS) provisions in the territorial jurisdiction of India is dealt with in the Sections 3, 4, 5, 6 and 7 of Biological Diversity Act 2002 and in the Biological Diversity Rules sections 14-20. This paper aims to review the major bottlenecks encountered in implementing the ABS mechanisms for sustainable management of resources in the specific context of State Biodiversity Boards.

International Policies for Sustainable Management of Bioresources

The Convention on Biological Diversity (CBD) aims to put in place a comprehensive international regime for the sustainable management of biological resource (www.cbd.int). The key components proposed for an effective ABS regime are (i) sovereignty of the state over genetic resources, (ii) Prior Informed Consent (PIC) from the party providing access to biological resources, (iii) Mutually Agreed Terms (MATs) for access and use of biological resources (iv) benefit sharing from access to and

use of genetic resources and associated traditional knowledge. The CBD recognizes the sovereign rights of States over their natural resources in areas within their jurisdiction. Article 15 of CBD calls for the Parties to establish systems and procedures for access to genetic resources and fair and equitable sharing of the benefits, arising out of the utilization of genetic resources and a number of countries are at various stages in implementing a regulatory framework.

India is committed to the implementation of international and national policies and programme related to environment, biodiversity, trade and intellectual property rights. India is a party to major international conventions related to wild life conservation, viz., Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), International Union for Conservation of Nature and Natural Resources (IUCN), International Whaling Commission (IWC), United Nations Educational, Scientific and Cultural Organization-World Heritage Committee (UNESCO-WHC), Convention on Migratory Species (CMS), Ramsar Convention on Wetlands, Convention on Biological Diversity, and others (envfor.nic.in).

As a party to CBD, India has the authority to determine access to genetic resources in areas within their jurisdiction and Biodiversity Act and Rules lays down the mechanism for regulated access to biological resources for commercial utilization of both foreign nationals and Indians. Under the Nagoya Protocol, if a permit or its equivalent is granted for accessing genetic resources, the country issuing the permit is required to make it available to the Access and Benefit Sharing Clearing-House (ABS-CH). The permit or its equivalent then becomes an internationally recognized certificate of compliance as provided in the Protocol. The ABS Clearing-House allows providers to share information on the terms for accessing biological resources and traditional knowledge through this platform and facilitates a link between users and providers of biological resources. As on July 2016, India has signed 24 Internationally recognized certificates of compliance of which thirteen are in Form III , ten in Form I and one in form II.

ABS and BioTrade

BioTrade refers to the collection, production, transformation and commercialization of goods and services derived from biodiversity in environmentally, socially and economically sustainable ways (www.unctad.org). The sustainability of BioTrade is guaranteed by adherence to principles and the working approach focusing on three areas: value chain, ecosystem and adaptive management as defined by UNCTAD. Ethical BioTrade can contribute to reduce direct pressures on biodiversity and ecosystem services worldwide, as well as to maintaining and improving human well-being, BioTrade is being recognized as an incentive to conserve biodiversity while at the same time addressing sustainable sourcing, poverty alleviation and supporting sustainable livelihoods in developing countries and contribute to effective implementation of the ABS provisions of the CBD (Vijay *et al*., 2015). The ABS mechanism elaborated under the Protocol specifically deals with genetic resources, their biochemicals and associated knowledge. In Biodiversity Act, 2002 commercial utilization has been defined as end uses of biological resources for

commercial utilization. ABS and BioTrade will mutually benefit one another (Vijay *et al*., 2015) by promoting sustainable sourcing and use of local biological resources for trade at one end, and fair and equitable share of benefits to the communities and conservation of local biological diversity at other end. The supply chain may include indigenous people, farmers, collectors, researchers distributors and traders and industries. India has developed a broad and all-embracing ABS legislation, which applies to commercial utilization of bio resources. As per Ethical Bio trade principles (USTD01 – Ethical BioTrade Standard – 2012-04-11) the sourcing of the species shall be supported by management documents addressing, inter alia: harvest rates, collection techniques, agricultural practices, monitoring for regeneration rates for sustainable utilization of sourced species. The 2012 version of the The Ethical BioTrade Standard revised from the 2007 standard is based on the BioTrade Principles and Criteria developed by the UNCTAD BioTrade Initiative. As per Ethical Bio Trade standard 2012 section 2.1.5 the organisation's sourcing activities should ensure that the harvest rates and regeneration rates are sustainable in the long-term. Further a monitoring system should be in place that allows continual adjustment of collection and/ or cultivation practices (harvest rates, collection techniques, agricultural practices) with the aim of guaranteeing an adaptive management of the sourced species. Ethical BioTrade Standard applies to all natural ingredients whether from wild collection and/or cultivation practices and promotes "Sourcing with respect". A traceability system shall be in place allowing identifying the origin of the natural ingredients. Hence, ABS and BioTrade should complement each other based on case to case sector needs as both of them address the three objectives of CBD- Conservation, Sustainable utilization and Benefit sharing.

ABS and Resource Mobilization for Conservation

a. Medicinal plants

Modern pharmacopoeia contains at least 25% drugs derived from plants and many others which are synthetic analogues built on prototype compounds isolated from plants. It has been estimated that over 70% of the drugs developed so far are based on or derived from natural products (Newman *et al*., 2007). The world herbal trade stands at US$ 120 billion. The domestic trade of the AYUSH industry is of the order of Rs. 80 to 90 billion. Indian medicinal plants and products account for exports in the range of Rs. 10 billion (www.nmpb.nic.in)

About 960 species of medicinal plants are estimated to be traded in India of which 178 species have annual consumption levels in excess of 100 metric tons. Harvest from the wild to a sustainable level requires the development of an effective and scientific regulatory system of collection. The significance of a national regulation for access to bioresources for commercial utilization is increasing in this context to regulate the unsustainable utilization of bioresources. As per Biological Diversity Act, 2002, Biodiversity Management Committee is empowered to levy collection charges which may be used for conservation or benefit of the local community. Mobilizing resources for conservation and management is acknowledged as a huge challenge and ABS is emerging as an internal financial option. Valuation is an important tool for fixing the benefit sharing

criteria and signing ABS agreements and will function as an incentive mechanism for preserving biodiversity (Nelliyat & Pisupati, 2013). ABS mechanism developed by National Biodiversity Authority (NBA) provided to link market and access to bio resources and ensure that monetary benefits arising out of the bio resource flow back to the area from where it is sourced. Domestic-level access measures create legal certainty and provide for issuance of a permit or equivalent when access is granted. At the same time it ensures a regulatory mechanism for sustainable harvest and quality raw materials for the industries.

b. Marine Bioresources

The value estimated for the ecosystem services and natural capital of Kerala coast is US $ 1660-1930 billion per year from an area of 260101 km^2 which includes brackish water, estuaries and open ocean (Joshi *et al., 2015)*. Values showed an increasing order from open ocean, Exclusive Economic Zone *(*EEZ), continental shelf, estuaries and brackish water area. The essential ecosystem services and goods particularly in the form of fish and marine bioresources is rapidly declining due to unsustainable utilization. In Kerala, the whitefish, *Lactarius lactarius* and the silver pomfret, *Pampus argenteus* were identified as depleted stocks as their recent average catch levels were between 10 and 6% of the maximum and Arius sp. was identified as a collapsed stock as its recent average catch level was only 0.7% (below 5%) of the long - term maximum catch. Over expolitation of food fishes has resulted in population declines of *Horabagrus brachysoms* (35% decline over the past 10 years), *Tor khudree* (60-70%), *T. malabaricus* (50-60%), *Hypselobarbus curmuca* (50%) *H. dubius* (30%), *H. kolus* (30%) and *H. micropogon* (50%). There is a need to identify ABS as resource mobilizing strategy for generating local finances for conservation of marine bioresources.

Marine genetic resources found within the EEZ are subject to national laws, and to provisions of the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation. In the high seas, natural resources are considered to be the "common heritage of humankind" and are subject to special rules under the United Nations Convention on the Law of the Sea (UNCLOS). Specialised ABS rules for these resources have not yet been developed. The benefit sharing regime for marine resources throws open many challenges as whether to establish different benefit sharing regimes for marine resources from the Area and or the high seas, access regimes for marine resources moving through the sea bed etc. Developing monitoring and compliance measures and developing alternate systems when determining ownership and thereby prior informed consent is not feasible, are other issues to be considered.

Regulated Access -
Biological Diversity Act 2002

The Biological Diversity Act, 2002 provides an approach to sustainably use the economic potential provided by biodiversity and ecosystem services for human welfare by imposing regulations, at the same time exempting local communities from such restrictions and the Act and Rules is more of an access regime. Regulation of access to bioresources for commercial utilization is necessary in view of the increasing instances of bio-piracy and growing emphasis on ethical BioTrade and it is the primary step before

negotiating for benefit sharing. The guidelines for Access and Benefit Sharing serves to combine the two ideas of access and benefit sharing as envisaged in Nagoya Protocol.

Operationalization of ABS Mechanism - Critical Issues

a. Benefit sharing arrangements

Currently formula followed by State Biodiversity Boards (SBBs) for benefit sharing arrangements is generally a fixed percentage of gross sales of the commercial product. This, however, does not fully reflect the economic potential of the resource nor the threat category of the resource. Periodical valuation of the economic value will help in determining and realizing realistic estimates of benefits derivable from the accessed resources. Further clarity is also necessary in the case of poly herbal formulations as according to the recent notification, products that are derived from the items listed as Normally Traded Commodities (NTC) and traded as a matter of common practice are exempted from the purview of the Act.

b. Bioprospecting and ABS

Research on bioprospecting and ultimately field testing and commercialization of products are time consuming and an expensive process and pharmaceutical companies may not be interested in negotiating for access for commercialization. A wide range of sectors as pharmaceutical, biotechnology, seed, crop protection, horticulture, cosmetic and personal care, fragrance and flavor, food and beverage industries etc. undertake research and develop commercial products from bioresources. Each of these sectors has different needs and access natural resources in different ways and each sector has different profit margins. Access to bioresources may be sought purely for purposes of research, as per the relevant section the Act. In such cases enforcing the terms on the commercial implications of access granted for research purposes may result in under valuing the real economic potential of the bioresource as there is a possibility of commercial applications ensuing from the research. Milestone payment streams based on economic valuation of the product at each stage of research process could ensure a higher rate of return.

c. Commercialization of analogous compounds and ABS

Another scenario which has to be visualized is that in many cases based on bio prospecting, synthetic analogues for the active ingredient may be developed. An active ingredient of a medicinal plant may be identified and later isolated. This isolate may then be synthetically produced using various technological processes. Under such circumstances benefit sharing provisions should take into account the role played by the natural resource and related traditional knowledge in developing the analogue and financial negotiations may be based on this.

d. Commercialization of bioresources based on secondary data

As per section 7 Indian citizens are required to give prior intimation to State Biodiversity Boards for obtaining bioresources for biosurvey and bio-utilization for commercial utilization. Small scale manufacturing units depend on secondary sources such as databases and published literature in peer reviewed journals for prospecting bio resources with commercial value and hence custodians of traditional knowledge who supplied the information for the original research may be bypassed. The Peoples Biodiversity Register (PBR) is a document

that records the diversity of species of flora and fauna. As per Kerala Biological Diversity Rules, 2008 section 20 (7) regulation of access and protection of the biodiversity information and traditional knowledge included in such registers, to outside persons and agencies is the responsibility of Local self Government and Biodiversity management committee (Kerala Biological Diversity Rules, 2008). The extent of legal protection provided by such registers has to be explored.

e. Collective ownership of Traditional Knowledge

The development of a robust system of benefit sharing can be evolved only when ownership rights of traditional knowledge is clear. It is commonly found that traditional knowledge related to specific use of bioresources may be shared within or between communities within a state or across different states. Knowledge may also remain in the custody of a family and is mostly kept secret and is passed on orally. Difficulty in identifying exact custodians of traditional knowledge may lead to difficulties in negotiating benefit sharing agreements. Identifying TK with potential and scientifically validating it is another problem. Section 36(5) provides for protection of knowledge of local people relating to biodiversity through measures such as registration of such knowledge, and development of a *sui generis* system. Biodiversity Act through PBR envisages the creation of decentralised country-wide database on status of biological resources, which interalia includes medicinal plants, cultivars of fruit trees or freshwater fishes etc. They also include local knowledge on properties and uses of bioresources, drought resistance of certain varieties, methods of preservation of foods, or use of certain plants in treating human or livestock diseases. ABS can also serve to mobilize resources to conduct scientific research on TK for developing new scientifically validated herbal drugs/nutraceuticals and enhance the livelihood of knowledge providers through contributions to local economy/ setting up production units in areas from where biological resource has been accessed.

f. Bioresources and collection source

A major predicament in implementing ABS at state level is the lack of traceability of collection source. Benefit sharing agreements for the sourcing of commercially potential resources cultivated under buy back scheme/ directly cultivated by industries and from raw drug shops with no traceability to place of origin is difficult. Frequently the bioresource may not be exclusive to one state and may be sourced from neighboring states consequently benefit sharing arrangements may involve different State Biodiversity Boards. Or the bioresource may be sourced from one state and processed for commercial utilization in another state leading to difficulty in enforcing the ABS provisions in the state. A state wise data base of bioresources traded is necessary.

g. Identifying industries utilizing bioresources

The implementation of an ABS regime is also hampered by difficulty in identifying industries coming under the purview taking into account the definitions of Biological Resources (section 2c), by-products and value added products, (section 2p) and commercial utilization (section 2f) as per the Act.

h. Normally traded commodities

The need for identification of Normally

Traded Commodities (NTC) state wise is another issue which needs consideration as the local demand for bioresources varies from state to state. The data on commercial utilization of medicinal plant species needs to be periodically updated with accurate botanical names and the sources of supply (cultivated/planted/wild-with details of regions/locations). This is possible only with proper co-operation of user industries. An assessment of each of the medicinal plant species in significant trade for its conservation status, endemism etc is necessary before being included as NTC. The NTC have been recently expanded to include 384 items which are commonly traded along with plant part traded, and includes mostly cultivated species and in a few cases cultivated and wild species.

i. Synergy between various legislations

India has enacted various legislations for the management of the wildlife and biodiversity resources of the country. Conservation of natural resources is challenged by lack of synergies between policies and legal framework and institutional fragmentation. There are a number of Acts, Policies, Rules and Regulations that govern the trade and use of biological resources; of which the most relevant are: The Biological Diversity Act 2002, The Seed Act 1966, Indian Forest Act 1927, Forest (conservation) Act 1980, The Wildlife (Protection) Act 1972, The Environment (Protection) Act 1986, The Indian Fisheries Act 1897, The Patents Act 1970, The Protection of Plant Varieties and Farmers' Rights Act 2001, The Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006. Linking compliance with Biological Diversity Act to related rules may enable better awareness and stricter enactment at state level. The possibilities of linking compliance with the provisions of Section 7 of BD Act to manufacturing licenses and Good Manufacturing Practises (GMP) certification by drug control department/ issue of permits by forest department also has to be explored. The import and export of wild animals and plants is permitted in India through the Central Board of Excise and Customs points at Mumbai, Cochin, Amritsar, Kolkata, Delhi, Chennai and Tuticorin. To check illegal trade in wildlife, Wildlife Crime Control Bureau (WCCB) has regional and sub regional offices. Building synergies between such institutions will facilitate stricter enforcement of ABS provisions. Access to bioresources from, community–conserved areas, as well as protected areas raise distinct questions relating to prior informed consent and terms for ABS. Permitting procedures for research in protected areas should take into consideration these aspects.

BMC and Benefit Sharing

a. Role of BMC in environment protection

In spite of these constraints much ground work has been undertaken in India in strengthening the institutional mechanism for implementing BD act. The mandate of the BMCs is conservation, sustainable use, documentation of biodiversity and chronicling of knowledge relating to biodiversity. In Kerala, BMC has been authorized to function as "Environmental Watch Group" and work for incorporating Primary Environmental Protection Programmes in the schemes of the Panchayat, present them in the Gramsabha and take actions to include them in the development schemes of the panchayat (www.keralabiodiversity.org). At the grass roots level, primary environmental protection will be the responsibility of the BMC of respective panchayat. The respective BMC

will be responsible to inform the concerned authorities for taking immediate action against all activities violating environmental rules, acts, notifications, as also environmental depletion, general public health problems and circumstances which leads to/ or may lead to threat for human life. Formulation of directions for environmental conservation of Panchayat and their implementation through the Panchayat committee are also entrusted to BMC. The three-tiered organisational structure adopted in the Act leads to a decentralised governance system. Strengthening of the BMCs, which should play the pivotal role in the ABS system, is the crucial link.

b. Role of BMC in benefit sharing

The Biodiversity Act provides for payment of a prescribed fee to the Biodiversity Management Committees established at the Municipal or Panchayat level under "Access and Benefit Sharing" by companies who are using biological resources or use traditionally available knowledge which is often a bone of contention between companies and these Boards as they possess the power to grant them access to bio-resources of the State.

In Madhya Pradesh, the SBB facilitated an ABS agreement for the medicinal herb Kalmegh (*Andrographis paniculata*) between the Malajkh and municipal BMC in Balaghat and the bioresource company Natural Remedies, manufacturers of ayurvedic veterinary products and herbal medicines. The Non Timber Forest Product collectors were collecting Kalmegh from wild and selling it at the rate of Rs 5/kg. Natural Remedies assured a minimum purchase price of Rs 23/kg. This case study demonstrates the role of SBB and BMC in identifying demand for specific medicinal plants for trade and marketing in the area (Bhatt *et al*., 2012).

In Andhra Pradesh, Bio-India Biologicals (BIB), Hyderabad, along with NBA , SBB and BMC entered into a benefit sharing agreement for top quality leaves of Neem with a procurement price of Rs. 100 per kg. The leaves are to be transported to Japan to produce Neem based water for a Japanese company. The Neem leaves were sourced from the Amarchintha village in Mahabubnagar district (www.nbaindia.org).

Indian Institute of Oil Seeds Research (IIOR), Hyderabad is one of the first ICAR institute to take up the initiative to follow Act and Rules in accessing local bio-resources by obtaining necessary permissions for their research patents and subsequent commercial utilization. IIOR accessed microbial bio resources for R & D to develop eco friendly insect pest and plant disease management of crops and transferred the research results to two private companies M/S Maa Bhagwathi and M/S Poabs Biotech for commercial purposes. Both the companies submitted Form I to state biodiversity boards of Andhra Pradesh and Telengana and entered into ABS agreements. The BMCs are expected to get Rs. 10 lakh/year from the two companies out of these agreements, further IIOPR is sharing 3% of the licence fee charged from entrepreneurs with SBB (UNDP India Biodiversity Awards, 2016).

c. Benefit sharing for sustainable livelihood- People's Artificial Reefs (PAR)

The concept of PAR has its roots in traditional knowledge documented in Marine Biodiversity Register (prepared by Kerala State Biodiversity Board), that naturally available reef areas

are swarming with fishes. People's artificial reefs (PAR) project funded by Kerala State Biodiversity Board deployed two artificial reefs along the inshore region off the Kannanthura and Valiathura coasts of Thiruvananthpuram, Kerala. The position for deposition of reefs and the raw materials to be used were decided by fisherman based on their time tested knowledge. The reefs were manually built by fisherman using natural materials (wooden boats). The boats were sunk along with coconut peduncles and sand bags for attracting spawning fishes. Against an initial investment of only Rs. 30,000/- the revenue realized during one month alone was nearly Rs. 50,000/-. Monitoring is done by local people and the resources are exclusively managed by fishermen ensuring equitable sharing of benefits to the custodians of bioresources. The interventions based on traditional practices, community led enterprise development at local level, leveraging of markets provide new innovative approaches for benefit sharing. This is also an example of how knowledge related to bioresource use can be effectively utilized to widen the economic opportunities of the communities. For implementing the Nagoya Protocol there is a necessity to look into such novel and non standard initiatives that could have a potential for benefit sharing and enhanced livelihood options for the dependent communities.

Conclusions

ABS is an untapped opportunity as economic benefits of biodiversity is worth trillions of dollars every year (Constanza *et al.*, 1997) and their potential need to be realized. Drug manufacturers and exporters are the major consumers of wild medicinal plant materials and they should be duty bound to ensure that a part of their revenue from commercial utilization of bio resources flows back to the communities, for the conservation of the natural resources on which the industry is dependent. The local communities have nurtured the genetic diversity over the years and BD act provides the legislative framework to ensure that communities benefit from the use of their genetic resources and traditional knowledge. This will also help in creating awareness of value of bio resources of their locality, which will ultimately lead to creation of a sense of ownership of natural resources among communities and aid in conservation of biodiversity in the long term. The challenge is to harness this sustainably by effective implementation of Biological Diversity Act, at the same time keeping in view that the principles of conservation ethics are not undermined. Awareness and capacity building is the basic framework for the success of the implementation of BD Act. Building capacity across a range of institutions including BMC and creating awareness of the Act and Rules are the overwhelming tasks before state biodiversity boards. The implementation of a proper ABS regime through BD Act and rules will ensure that bio resource consumers and local communities value the industrial use of their resources while creating incentives for conservation.

References

1. Access and Benefit sharing: Experiences from India: ABS Factsheets can be accessed from www.nbaindia.org
2. Access and Benefit Sharing A model from the Indian Institute of Oil Seeds Research , UNDP India Biodiversity Awards 2016.
3. Bhattt S, Bavikattee K and Suneetha M S 2012. Community based experiences on access and benefit sharing case studies.

National Biodiversity Authority, Chennai, India.

4. Constanza R, D'Arge R, de Groot R, Fabes S, Grano M, Hannon B, Limburg K, Naeem S, O'Neil R V, Pareulo J, Raskin R, Sulton P and Van Der Belt M 1997. The value of the world's ecosystem services and natural capital. Nature. 387: 254-260.
5. www.keralabiodiversity.org
6. http://www.cbd.int.
7. http://envfor.nic.in/division/international-conventions
8. Joshi K K, Narayanakumar R., Ranimary G, Molly V, Jasmine S, Srinath K R, Saravanan S, Somy K, Geetha A, Geetha P M and Gimy G 2015. Biodiversity Valuation of Marine Ecosystem of the South-West Coast of India with Special Reference to Kerala Coast. In: Biodiversity Conservation - Challenges for the Future. Laladhas K P, Oommen V Oommen, Sudhakaran P R (Eds.) ISBN: 978-1-68108-022-2. Kerala State Biodiversity Board, Thiruvananthapuram, Kerala. 11:183-193.
9. Suneetha M S and Balakrishna P 2009. Learning from the Practitioners: Benefit Sharing Perspectives from Enterprising Communities. UNU Institute for the advanced study of sustainability. Available at http://ias.unu.edu/resource_centre/UNU-UNEP_Learning_from_practitioners.pdf
10. Newman D J and Gordon M Cragg 2007. Natural Products as Sources of New Drugs over the Last 25 Years. Journal of Natural Products. 70: 461-477.
11. Nelliyat P and Pisupati B 2013. Valuation of Biodiversity India Dissemination Paper 1, 2, 3 National Biodiversity Authority, Chennai.
12. The Biological Diversity Act, 2002 and Rules, 2004. National Biodiversity Authority, Chennai, India. Available at www.nbaindia.org
13. The Kerala Biological Diversity Rules, 2008 available at www.keralabiodiversity.org
14. USTD01 – Ethical BioTrade Standard – 2012-04-11 Union for ethical BioTrade Accessed http://ethicalbiotrade.org/dl/membership/STD01-Ethical-BioTrade-Standard_2012-04-11_ENG.pdf
15. Vijay V, Lavvanya V and Pisupati B 2015. Challenges on the implementation of BioTrade and Access and Benefit sharing, peer Review on the implementation of Nagoya Protocol and its impact over certain aspects of BioTrade. United Nations Conference on Trade and Development Accessed http://unctad.org/meetings/en/Contribution/ditc-ted-19112015-PeerReviewNagoya-fledge-ind-unep.pdf
16. www.unctad.org
17. www.nmpb.nic.in ■