Bioresources protection in North East India

The unique richness of bioresources in North East India makes it a potential hub of economy growth of the country to a competent level if utilized and tapped efficiently. The current feature explores the various measures for bioresource protection and management in North East India. The North-East (NE) India (located between 87°32'E to 97°52'E latitude and 21°34' N to 29°50' N latitude) comprising of the states of Arunachal Pradesh, Assam, Meghalaya, Manipur, Tripura, Mizoram, Nagaland and Sikkim are physiographically categorized into the Eastern Himalayas, Northeast hills (Patkai-Naga Hills and Lushai Hills) and the Brahmaputra and Barak Valley plains. Ecological environment with high humid conditions have resulted larger speciation and genetic diversity of plant and animal species including domesticated ones, thus adding to high endemcity of the flora (Chatterjee, 1939). As a result the region finds place in part of two-biodiversity hotspot namely Himalayan (covering Sikkim, Assam, and Arunachal Pradesh) and Indo Burma (part of north-eastern India especially southern part of the Brahmaputra River) among the 34 biodiversity hotspots of the world (Mittermeier et al. 2003). About 10,000 plants species are estimated in the Himalaya hotspot where 3,160 species are endemic. Orchidaceae with 750 species is the largest family of flowering plants in the hotspot. The Eastern Himalaya is also a center of diversity for Rhododendron, Primula, and Pedicularis. A staggering figure of 52% of vascular plant species (7000 of 13,500) from Indo-Burma hotspot is endemic. The moist tropical region of NE India contains some of the most interesting and unique forests in the world. They have been surviving almost unchanged since, 120 million years ago, when India was still a part of the Gondwanaland. Consequently, these forests, which are differentiated into at least 52 different types, are now home to one of the worlds highest diversity of plants and animals. Within India, the NE region is the Biogeographical Gateway to Indias richest biodiversity zones important for the genetic resources world over. Ironically this is also one of the worlds most threatened area and recent estimates indicate it would not be long when all this will disappear in the next 15 years. Climate change may pose as an added threat to the rich biodiversity of this part of India.

Climate change and bioresources

There is strong consensus among the current scientific communities that most of the recent warming due to anthropogenic activities is associated with increasing atmospheric concentrations of greenhouse gases (IPCC, 2007). Carbon dioxide is the most important anthropogenic greenhouse gas (IPCC, 2007). The global atmospheric concentration of carbon dioxide has increased from a pre-industrial value of about 280 ppm to 379 ppm in 2005. The atmospheric concentration of carbon dioxide in 2005 exceeds by far the natural range over the last 650,000 years (180 to 300 ppm) as determined from ice cores (IPCC 2007). Over half the anthropogenic contribution comes from activities associated with bioresource exploitation. Enriched CO2 may be a seen as a boon for agriculture and bioresources at same parts of the globe, while the secondary influences of climate change, viz. temperature and precipitation change could turn out to be as counterproductive. With the increases in global average temperature exceeding 1.5-2.5°C and in associated atmospheric carbon dioxide concentrations, there are projected to be major changes in ecosystem structure and function, species ecological interactions, and species geographic ranges, with predominantly negative consequences for biodiversity, and ecosystem goods and services e.g., water and food supply (IPCC, 2007). Conservation need of hour

High abundance of primitive angiosperm families such as Magnoliaceae and Winteraceae in the region have made Takhtajan (1991), to refer the region as Cradle of flowering plants and Vavilov (1951) as Hindustan Centre of Origin of Cultivated Plant. Over 50 species of economic plants have their genetic diversity in this region (Zeven and Zhukovsky, 1975). Based on geographical distribution, taxonomical and cyto-genetic studies, Chakravorty (1951) advocated Assam-Burma-Siam-Indo-China region as the centre of origin of Musa. Out of estimated 800 species consumed as food plants in India about 300 species occur in Eastern Himalaya alone (Singh and Arora, 1978). Despite awareness of their biological diversity, the Eastern Himalaya and Indo-Burma region remain disgracefully data-poor regions for a wide variety of plant and animal taxa (Mittermeier et al. 2003). However the existing traditional knowledge based on plant and animal resource remains positive indicator for researcher. Northeast India witnesses 130 major tribal communities of India total of 427 tribal communities (Ramakrishnan, 1992; Dutta and Dutta, 2005; Prakash, 2005). This most fascinating traditional community, who living here for thousands of years have built a precious knowledge-base about the use of the rich bio-resources.
of the region. While people in most other parts of the country as well as in the world have already forgotten the use of wild plants for edible and medicinal purpose, it is still well preserved and practiced by the local communities. Northeast has a valuable heritage of herbal remedies. Its rural people and tribal living in remote/forest areas still depend to a great extent on the indigenous systems medicine/cultivation. Different authors have reported 1350 species of plants used in ethno-medicinal preparations, 665 species of food plants and 899 species for miscellaneous uses from the entire NE India (Dutta and Dutta, 2005). The first ever research findings on evaluation of cross-taxon distributional congruence in Indo-Burma and Himalayan biodiversity hotspot was reported by Pawar et al. (2007). Some of the unique endemic species of the region are Coptis teeta (mishmi teeta) of Mishmi Hills of Arunachal Pradesh, Napenthes khasiana of Khazi Hills (Meghalaya,) Vanda coerulea (Meghalaya, Manipur) and Renanthera imschootiana (Manipur). Some of the factors threatening the existence of biodiversity of the NE are habitat fragmentation and destruction due to deforestation, developmental activity, shifting cultivation, poaching, trade in wild flora and fauna, introduction of exotics and rapid wild spread of invasive species (Behera, 2001). The absence of modernized socio-economic and public healthcare systems along with lack of employment and good infrastructure facility has compelled the poor people of this region to depend on bio-resources for their livelihood generation. This in turn poses a great degree of threat to the original biota making it one of the most hot spot critical eco-region. Instead of conserving the rich forest resources, the current process of development in resource use practices has led to depletion of many biological resources at a non-renewable rate. Lack of organized marketing system for forest produce of medicinal herbal, and other industrial importance have aggravated the situation further. Emergence of Intellectual Property Rights (IPR) as a major economic factor and widespread use of bioresources and traditional knowledge (TK) of developing countries by multinational pharmaceutical have instigated actions for conservation, protection and utilization of rich bio resources. It has been estimated that the total market value of medicinal plants/ herbs from NE alone that are traded out runs to 150 crores per year (source NEDFI 2006)

Measures for protection of bioresources
1. Inventorization and database India is one of the signatory of the International Convention of Biological Diversity and is committed to undertake inventorization of the components of biological diversity important for their conservation and sustainable utilization. The intrinsic potential of biodiversity as key resource for evolving new kinds of food, cosmetics, drugs, pharmaceuticals and other chemicals of agro-industrial importance has been increasingly realized. Therefore a comprehensive and systematic inventorization of rich resources and preparation of data base at landscape level will not only ensure protection but will also help in identifying the potential factors that pose threat to bioresources. A multi-institutional collaborative programme on bioprospecting of Biological Wealth mainly on the two hot-spot regions - North Eastern Himalayas and South-Western Ghats was initiated in October 1997 by the Department of Biotechnology, Government of India. The study have suggested to address issues of identifying biomolecules, gene markers, understanding generic and species variability, developing habitat relationship of economically important plant resources, their habitat characterization and landscape characters so as to focus on comprehensive biodiversity conservation. To initiate these ventures, a task force under central government involving states governments and relevant institutions and stakeholders needs to be formed to formulate the workable strategy in a mission mode. This also calls for an organized approach both at central and regional levels. Establishment of a network of institutions having potentialities to take up the locations specific task and to successfully execute it avoiding duplication of works will be the ultimate key. The database needs to be more exhaustive and authentic disclosing full details in local vernacular and regional languages taking into confidence local communities of the place. Verifiable indicators need to be identified so that the same can be transmitted for future research work.

2. Awareness It has been seen that the people are not aware at all about the bioresources at species level or at community level. The haphazard exploitation of the resources to cater the immediate need remained the guiding force of the resource utilization pattern. Local communities know about the harvesting but do not have any idea about the processing and marketing of the value added products. The economic benefit from the bioresources at an enhanced level is still a distant dream to the people; hence awareness and a comprehensive set up could cover all the aspects. Non government based/government based organization needs to create the awareness in more pro-active manner among the school children, general public and policy makers regarding environmental problems and garner their support to minimize and solve such problems.

3. Support system The Government financial support does not reach the target people in general
and if reached, it would be only a small fraction of the sanctioned money. Hence, it is essential that a full proof mechanism be initiated, involving people in the monitoring of the work which will help to develop a sense of involvement in their process of the development of the region. It would be worthwhile to establish and maintain a network of local NGOs at regional level to connect them at national and international level and to provide a forum for exchanging views and ideas on conservation of biodiversity and environmental preservation. Encouraging sustainable livelihood in selected fringe villages around protected areas in the region through integrated community development initiatives will yield fruitful results on long run.

4. Institutional and legal mechanism
Local Panchayat committee at different levels can be a part of the monitoring process for protection of bioresources and can decide on taking appropriate legal actions on biodiversity related offenders. Stringent laws can be framed and enforced. Also important is increase vigilance, to curtail and eliminate the illegal trade on wildlife and their parts from the region through greater awareness and legal procedures. For an efficient management of any resources action should start from the bottom. Bioresources Management Association (BCA) at the village level should be set up. As Watershed Users Association (WUA) concept has created a better management system for water at the village level, BCA would also be able to create an environment of self preservation and judicious utilization of bioresources at the grass-root level. Communities and local administrative units should be sensitized about IPR issues. Government should take special care for the preservation and sustainable utilization of bioresources in biodiversity hot spots regions like NE.

Way ahead:
1. Avenues and opportunities for development- The NE region is blessed with natures bounty as regard to the wealth of industrially potential flora, fauna and microbial system. The systematic evaluation of medicinal properties of traditionally used plants, isolation and characterization of active biomolecules would open a wide range of scope of drug formulation. Further, clinically active biomolecules that are synthesized and deposited in the plants system under various abiotic stress conditions would help in understanding the stress regulation and would unfold various avenues of economic development opportunities. Bioprospecting of rich soil micro-organisms can also lead to the discovery of novel antibodies and other industrial products. 2. Policy and Advocacy- Government should formulate NE biotech policy for quality research and development for tapping the potential and transfer the user-friendly technology from lab to field for the rapid production of useful plants and their products. 3. Participatory approach- Participatory bioresources management should be formulated. A Regional Institute for Bioresources Conservation and Utilization (RIBCU) could be established in the region for generating awareness and providing technical know how for efficient use of rich bioresources of the region. Here it is worth mentioning that The National Bioresource Development Board (NBDB) has continued its support to resource and region-specific programmes as well as to those on creation of awareness. 4. Blending knowledge with science- Blending of traditional knowledge with contemporary sciences on use of the flora and fauna will ensure the economic development while taking care of ecological prosperity of the region. Non-governmental organizations (NGOs), other forms of grass-root level organisations can play a vital role in increasing awareness and commercialization. 5. Revenues- Community based ecotourism could be initiated to generate revenues. This could also create an excellent opportunity for interaction and sharing knowledge which will lead to the conservation of the natural resources to the maximum possible extent.

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References