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BIODIVERSITY WATCH

Biodiversity Watch
International Journal on
Biodiversity Issuea

Editor

DR. R.N. PATI



About the Journal

International Journal on Biodiversity Watch is a peer reviewed journal developed to publish original, innovative and novel research articles related to research on Forest Law Enforcement, Forest related policies and laws, Legal framework to support and protect land tenure, ownership and use rights, Concordance of Broader Development Policies with Forest Policies, existence of legal provisions and mechanisms for equitable sharing of forest revenue, cooperation and coordination of national law enforcement agencies, including policy and customs, in forest law enforcement at different levels and across agencies, administration of land tenure and property rights, measures to address corruption, transparency of forest revenue collection, budgeting, expenditure, accounting, redistribution and audit, medicinal plants and practices, Biodiversity Conservation issues, forest governance policy, programs and related issues.

This peer-reviewed scientific journal has been quarterly brought out by VRM Foundation International, Bhubaneswar, Odisha, India.

The Journal publishes investigative and empirical papers covering research findings across the sectors of forest governance, biodiversity conservation, issues relating to climate change, community based conservation, traditional medicine and medicinal plants.

All theoretical and methodological perspectives are welcomed.

The Editorial Board of the journal also encourage the submission of, original manuscript translations, short papers/communications presenting various ancient literatures related to use of medicinal plants and folk medicine system across different regions of India and world.

Aim and Scope

The main aim of the journal is to publish significant research focusing on Biodiversity Conservation and Forest Governance issues.

This journal aims at publishing investigative research articles covering policies, programs of Biodiversity Conservation, Challenges & threats to forest governance, conservation of medicinal plants and mainstreaming traditional knowledge into protection of biodiversity, community based conservation approach and so on.

Subjects covered in the journal

The International Journal on Biodiversity Watch presents original research in naturally occurring medicines and their related foods and cosmetics.

The International Journal publishes Reviews, Mini-Reviews, Original Papers, Notes, Rapid Communications, Natural Medicine Notes, and Natural Resource Letters Three papers in each volume will be honored as Excellent Papers.

It covers different dimensions of biodiversity conservation, sustainable development and environmental governances, best practices of Corporate Social Responsibility, Environmental Auditing, climate and ecosystem practices, sustainability management in corporate culture and corporate practices, substantive engineering in ecosystem functionality.

The International Journal on Biodiversity Watch is an open access journal that provides rapid publication (quarterly) of articles in all areas of the subject related to different issues of Biodiversity Conservation and Forest governance.

The Journal welcomes the submission of manuscripts that meet the general criteria of significance and scientific excellence. Papers will be published approximately two months after acceptance.

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Regular Articles: The regular research based articles covering different dimensions of thematic area of the journal are invited from scientist and researchers working in different universities and institutes in India.

The works should be original. The length of a full paper should be the minimum required to describe and interpret the work clearly.

Reviews: The journal accepts review of books by scientists and researchers published in India and abroad.

Reviews should be concise and no longer than 4-6 printed pages.

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Editor
DR. R.N. PATI

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The themes of the submitted article should be on forest governance, policy and programs on Biodiversity Conservation, conservation of medicinal plants and mainstreaming traditional knowledge into protection of biodiversity. Original research articles are invited on specific thematic area of forest governance and biodiversity conservation. The spectrum is very broad. It covers a wide range of issues relating to research on Biodiversity Conservation and forest governance.

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The language of the article should be written in English. All portions of the manuscript must be typed **double-spaced** and all pages numbered starting from the title page.

The **Title** should be a brief phrase describing the contents of the paper. The Title Page should include the authors' full names and affiliations, the name of the corresponding author along with phone, fax and E-mail information. Present addresses of authors should appear as a footnote.

The **Abstract** should be informative and completely self-explanatory, briefly present the topic, state the scope of the experiments, indicate significant data, and point out major findings and conclusions. The abstract should be 100 to 200 words in length. Complete sentences, active verbs, and the third person should be used, and the abstract should be written in the past tense. Standard nomenclature should be used and abbreviations should be avoided. No literature should be cited.

Following the abstract, about 3 to 10 **key words** that will provide indexing references should be listed.

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Editor's Note

- Dr. R.N. Pati

The issues of forest administration across different forest regions of India are numerous and complex. These issues are multiplied by misuse of Government Policy and programmes coupled with growing population pressure on forest land, industrialization, mining and dam activities in forest regions, poor environmental management practice and poor enforcement of Government Rules controlling unregulated exploitation of forest resources. I have visualized the issues of forest administration through my long term association with biodiversity and medicinal plant conservation projects implemented in the states of Chhattisgarh and Odisha. Lack of management procedures to promote coordination between different functional departments of the State Government is a serious bottleneck for ensuring smooth forest administration and participatory biodiversity conservation. Political willingness to ensure biodiversity conservation is missing very much across different States of India. Participatory forest management through Joint Forest Management (JFM) mode has been experimented across different states of India since last couple of years. This experimentation has not yielded the desired result in promoting bottoms up forest management mode. The principles of participatory management are emphasized on decentralization of power and resources to village community and promotion of healthy cooperation between villagers and forest department. In practice, it is observed that the decentralization of power and resources to village communities is not materialized in full form by Officers of Forest Department. The participatory forest management has not been fully institutionalized. My observation and empirical investigation in different forest regions of Chhattisgarh provide insights in categorizing different barriers to forest administration as noted below:

The projects implemented by forest department fail to incorporate the sustainable components after completion of the project. This is a serious drawback of healthy forest administration. A good number of time bound Projects on Biodiversity Conservation have been implemented in different forest regions of State in spite of numerous hurdles and challenges. These interventions have promoted infrastructure and facilities at grass-roots. These projects have delivered package of well designed benefits to forest dwelling community. But sustainability component after completion of the project is drastically missing. A very little effort has been made to link this project with community participation. The huge infrastructures and facilities developed through these Projects lie defunct and abandoned in absence of required personnel, funds and appropriate strategies. The time bound Projects without in-built strategy for sustainability has created poor sense of ownership among staffs and stakeholders for initiating appropriate follow up measures after withdrawal of the financial support.

The political intervention often leads to poor implementation of forest laws. The villagers view "*neta log jungle ko kha gaye*" which signifies that political leaders are responsible for destruction of natural resources. The forest dwellers alleged that the forest contractors responsible for illegal tree felling from the forest are protected by the leaders from being prosecuted. The traders involved in large scale bio-piracy and over

exploitation of habitats of species are encouraged by political leaders. The big farmers with herd of cattle are free to use restricted forest areas for cattle grazing with patronage of political leaders.

The peripheral forest officers are over tasked and overburdened with multifarious responsibility. They are handicapped to understand appropriately the vision, goal and approach of the Conservation Projects and their corresponding role and responsibility. Inadequate exposure to capacity building opportunity often refrain them from delivering justice to the Project. The shift of job responsibilities to non-qualified peripheral forest officers in different projects often obstructs healthy execution of biodiversity projects. It is observed that field level personnel are brought on deputation and deployed in administrative job without having adequate administrative experience. The Government policies and programmes are not thoroughly examined by such field level officers prior to preparing execution plan for the project. Deployments of field level personnel at desk work affect the desired process of monitoring and execution of different projects. The bureaucratization of implementation process of different conservation projects has not only stimulated poor self esteem among staffs and their participation in effective decision making process but also sabotaged timely reconstructive initiative.

The intra-departmental co-operation and co-ordination is drastically missing in implementation of different conservation projects. The replication of success stories of in-situ conservation approach experimented in other States very often nipped in the bud due to inter-departmental and intra-departmental non-cooperation and professional rivalry among senior forest officers.

The process of landscape change stimulated through internal migration and resettlement within regional territory is a serious threat to biodiversity conservation in Chhattisgarh. The agricultural encroachment on forest lands by immigrant settlers has led to massive erosion of habitats of MAP species since last couple of decades. The landscape change and conversion of forest into agricultural land is a common phenomenon in hundreds of villages in Chhattisgarh. The unholy alliance between political leaders and peripheral forest and revenue officers have encouraged large scale encroachment on forest land by immigrants through registration of forest and revenue encroachment in government records. After issue of land right documents on forest land, the illegal encroachment on forest land by vested interest elements have been multiplied two times within one year. The communities apprehend a great threat to conserve forest and biodiversity resources of the region. The population pressures on agricultural land and settlement of new immigrants in the villages have stimulated the growing process of landscape changes. The issues of landscape changes are numerous and complex. New environmental catastrophes and insurgencies have emerged. The impact is manifested in livelihood, nutrition, health and biodiversity. There are no dearths of examples of new settlers encroaching on forest land in numerous villages. Kewachi, a small tribal village, located 5 K.Ms away from Kewachi, MPCA, of Gaurdla Forest Range of Bilaspur is a burning example. More than 40 percent of inhabitants of Oraon community of this village have been immigrated from Sarguja, Bastar, Jashpur, Raigarh and Ambikapur regions of the state over last three decade. They have settled in this village and encroached upon the forest land for converting into agricultural land. Community auditing has validated illegal felling of trees, damage of

rich medicinal plants habitats and encroachment of not less than 20% of forest area by these immigrants over a period of three decades. New environmental threats to agriculture have emerged. A poisonous invading weed locally known as “Gajar Ghass” have emerged and invaded upon crop fields since last decade. The weeding operation of this poisoning weed with use of gloves by the farmers is time consuming and expensive. This weed has not only stimulated emergence of new skin diseases in the area but also damaged agricultural productivity adversely. New diseases like chicken guinea, dengue, swine flu and brain malaria have emerged in tribal villages of the state. The livestock has been brutally affected by unknown contagious and infectious diseases. The landscape change through process of agricultural encroachment has wiped out a good number of endangered medicinal plant species from the region. The impact of landscape change on biodiversity and community health has been taken as an important agenda in different international biodiversity conferences.

The medicinal plant species with greater market demand are now extinct from a good chunk of forest regions of State. These species are Sarpagandha (*Rauvolfia serpentina*), Bhuin Bhelwa (*Phyllanthus fraternus*), Kamraj (*Pygmaeopremna herbacea*), Tejraj, Bhojraj, (*Peucedanum dhana*), Rasana (*Vanda tessellate*), Marodfali (*Helicteres isora*), Malkagni (*Maytenus emarginata*), Bai bidang (*Embelia tsjeriam-cottam*), Chironjee (*Buchanania latifolia*), Aonla (*Emblica officinalis*), Harra (*Terminalia chebula*), Tendu (*Diospyros exsculpta*) and Dahiman.

The liberalisation of market forces coupled with globalization has not only increased global demand on herbal products, commoditization of goods and services and mining operation by big players in forest regions of Chhattisgarh but also changed the market scenario in all rural areas. The local based market system has been converted into hubs of national supply chain and collection points. The improved transportation networks in the forest regions and across national parks of Chhattisgarh have facilitated national and international trade of herbs and enhanced contact of traders with international regulatory regime. Since time immemorial, the extensive and historic trade routes were functional and linked with local health tradition of the region. The earlier trade of herbs was influenced by subsistence economy with greater focus on sustainable harvesting practice. The traditional healers strictly follow the customary rules governing harvest and sustainable use of plant species. Utmost precaution is taken by the traditional healers to harvest required quantum of herbs and minimizing wastage. The destructive harvesting practices stimulated by marketing economy has wiped out many species earlier abundantly available on backyard of every home. These species are either extinct or rarely available in forest. The traditional trade practices of herbs in Chhattisgarh were characterized by components of secrecy, generational control over territory, herb gathers and access to purchasers. The trading system was governed by customary rules. The liberalization of marketing forces after formation of new state has led to radical shift from subsistence economic requirement to commercialization of harvest of medicinal plants. The traditional herb gatherers were converted into “Kochia”, the agents of traders linked with lengthy marketing chain. In absence of appropriate regulatory infrastructure and legal framework, the rich habitats have been overexploited with administration of destructive harvesting practices by their agents. The collectors are always offered low rates of return which discourages them to opt for cultivation. The gatherers prefer to go for harvesting of MAPs species with less efforts

rather than opting for ex-situ conservation and cultivation. A good number species have become endangered. The environment activists raised these issues at different national and international forums. The government of India has not only initiated serious concerns over conservation of endangered species but also banned export of more than 50 endangered species. (Government of India, 1997) But, clandestine export continues violating the restrictions imposed on trade of these plants at grass roots. The traders enhance the supply to meet the growing global demand. Destructive harvesting has been multiplied. These insurgencies and conservation threats need to be balanced through community based conservation approach.

The coordinated conservation based on in-situ and ex-situ strategies need to be designed to safeguard rich bio-wealth from being overexploited. The conservation strategies need to be supported by a comprehensive reconstruction package covering following inbuilt components.

- Up gradation of information on medicinal plants and trade.
- Provision for addressing needs of the community and gender.
- Mechanism for inventorying and monitoring the status of medicinal plant stocks.
- Protocols for sustainable harvesting practices
- Mechanism for micro enterprise development on herbal products
- Framework for use of indigenous taxonomies and para taxonomies.

Baseline information on local conservation status and pattern of use of species is pre-requisite for designing any viable strategy for conservation. This aspect is overlooked in ongoing conservation programmes. The data generated through periodic grade point survey by peripheral forest officials is crude. A resource inventory needs to be developed upgrading this data and generation of supportive data through additional ethno botanical survey. The expertise is not available with Forest Division level to document and upgrade base line information. This is a very serious drawback in the existing system. There are significant evidences that use of community based methodology for generation information on pattern of use and developing baseline data and local conservation status has provided insights for effective conservation approach. Conservation action without shrinkage of national marketing chains at regional point is a fruitless endeavor. The combination of sustainable harvesting with enhanced practices of local cultivation and introducing new model of trade would go a long way in eroding the network of national supply chains and collection point at local level. This is a challenging issue. The role of “Kochia”, the collecting agents created by traders at local points needs to be eliminated for ensuring balance between bio-cultural diversity and community empowerment process. They are parasites on eco health. These parasites shall be eliminated only through promotion of adequate regulatory infrastructure and implementation of stringent conservation laws. Promotion of bio-enterprising ventures on manufacturing of bio-fertilisers, bio-pesticides, bio mosquito coils etc needs to be encouraged through federation of bio-enterprisers. Women Self Help Groups working in the villages are vibrant forces to be inducted as community based bio entrepreneurs. The enterprise relating to value addition, processing, storing, sustainable harvesting remains a challenging area. A few potential local entrepreneurs dare to enter into this sector. The accessibility to technological inputs has isolated them from this sector.

Greater focus needs to be given on creation of a viable mechanism stimulating shift of individual ownership to community ownership on means of production in this sector.

There is urgent need for reformation of policies and programme at State level relating to conservation of MAPs resources. Legalising the promising local treatments is a challenging issue. Greater investment on research directed for validating efficacy of herbs would widen the horizon of conservation approach. Screening and approval of selected herbs as medicine would contribute significantly to sustainable conservation efforts. These reconstructive measures need to be devised and delivered in a package. This issue highlights different dimensions of forest governance across various regions of the country which need attention of policy makers and development actors for replication of best practices and correction of deficiencies.

Guest Editorial

Pratap Aditya Mishra

British administration had managed forests under a common property regime and our policy makers have sets rules and regulations and derived the plans and programmes referring to the documentation developed by them. Such generalization of historical forest management practices in India is not going to have major success as we have diversity of culture, different types of forests and administrative systems in different parts of the country.

We are all concerned that forest resources in India have been increasingly subjected to deforestation and degradation. The prevailing idea in the forest bureaucracy over one century has been that the conservation is the sole prerogative of the state. This notion undermines the concern and the ability of the forest dependent communities to preserve their own natural resource and ecosystem and this alienation of these communities from their life support systems has resulted in widespread forest degradation, at the same time placing the state forest departments in perpetual conflict with them.

It was much later thought and decided by the Government that Forest Management in India can be done best if it is based on 'co-management' and a 'give-and-take' relationship between the two major stakeholders, i.e. village communities and the Forest Department, and where NGO sector can play a vital role of mediation. One cannot hope to protect and preserve of India's forest as long as the conflict situation exists between the Forest Department and the village communities. Social defence is considered the best form of defence for proper management and protection of forest in India. No top down management approach will be able to manage forest sustainably under the principle of conventional or industrial policy, whose main objective and emphasis will be to generate economic benefits.

Joint Forest Management has been in operation for about 20 years in India and adopted by all States and UTs. The implementation of JFM programme aims to improve quality of forests besides improving the economic status of local people involved in protection and management of forests. It is a departure from the earlier forest policies practiced in India. The forest department sets the objectives of forest management under the JFM programme while the management responsibilities and benefits from the forest are expected to be shared by both the village communities and the forest department. As on March 2010 the total number of JFMCs in the country are 112, 896 and the forest area brought under it is 24.6 million ha,. But unfortunately as per the Government report there has been downward correction in number of JFMCs and forest area covered because many registered JFMCs were found non-functional. Also, there are a few small scale studies done at the state level.

Besides this one of the main features of Forest Rights Act (FRA), 2006 is to vest forest dwellers with forest rights to manage, protect and regenerate the forest, wide life and biodiversity on a sustainable basis. As per the report (Manthan 2010) prepared by National Committee jointly construed by Ministry of Forest and Environment and

Ministry of Tribal Affairs the progress in respect of the granting Community Forest Rights (CFR) has been very negligible despite the fact that the main intention of FRA is to promote community participation in the management of forests. There are number of issues which the National Committee has pointed out in the report. These include lack of clarity in the FRA Rules on the relationship between the FRA, Indian Forest Act 1927 and Wildlife Protection Act 1972 in relation to community forest rights and the role of the Forest Department in management of CFR.

To add woes to the worries there are also several problems in the acquisition of village common lands for JFM implementation at the grass root level, in particular, the bureaucratic procedures and delays. Confusion between the forest department and the revenue department over land records makes the situation more problematic. Acquisition of degraded lands classed as a common property resource is further aggravated by encroachment of local people onto such land.

The present arrangement of JFM is not a collaborative one but a compromising arrangement between the state and local villagers and. Even today many forest departments continue to perceive this arrangement of sharing benefits is essentially done to buy some peace with the local villagers. If the content and the process by which most state JFM resolutions have been framed are seen minutely then one can see the reflection of the inevitably unequal relationship between powerful state bureaucracies and forest dependent communities. In fact, the forest departments have unilateral decision making power to cancel such agreement if the forest dwelling communities are perceived as violating any given condition.

The rural focus policy and implementation can be a real strength multiplier for the nation where a proper forest management model should find in place in village economies. The State can effectively protect forests only by soliciting people's participation in forest management and village communities as forest users should shoulder the responsibility for protecting and managing their forests with the forest department. Under such an arrangement the local community can harvest products from their forests in a sustainable manner and with a sense of ownership.

The development of any successful doctrine is likely to face challenges. Although the JFM initiatives are becoming acceptable at various levels of governance in India it still confronts several teething problems inherited from the past. The collaborative public participation in decision-making situations needs to be promoted while the JFMCs should be empowered legally and financially. The intervention of the Government and institutional investment are vital to build the organizational skills of the communities. Finally, research and investigations are required to be done with respect to the policy and institutional mechanisms to introduce Clean Development Mechanism (CDM) – a requirement of Kyoto Protocol on climate change which can help carbon sink to a great extent.

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TRADITIONAL KNOWLEDGE AND FOREST MANAGEMENT PRACTICES FOR SUSTAINING LIFE ON EARTH

Stella Joy

Tara Joy

ABSTRACT

There are a few conservation systems that have been developed in the last century, that are inspired by traditional conservation methods. 'Permaculture' and 'Forest Gardening' are two examples of these. Both of these contain methods, which could prove to be very useful for creating and sustaining groves and corridors which fit with the needs and traditions of the local communities. Forest gardening is a food production and land management system based on replicating woodland ecosystems, but substituting some usual forest trees with fruit trees, herbs, medicinal plants and vegetables. Through the knowledge of companion planting, these can be intermixed to grow on mixed levels in the same vicinity. This is similar to and replicates natural forest systems. (Jacke and Toensmeier 2005). Permaculture means permanent agriculture and is a way of observing the dynamics of natural ecosystems. This knowledge can be applied in designing and constructing ecosystems that serve the needs of human populations without degrading the natural environments. Permaculture systems are proving to be successful in every ecosystem, including the tropics, deserts, mountains and oceans (Bill Mollison and Reny Mia Slay, 1991).

Keywords: Conservation, permaculture, forest gardening, eco-system, groves

INTRODUCTION

The sustenance of the incredible variety of species and biodiversity on planet Earth throughout millennia has been largely dependent on the abundance of water that exists here. Water covers more than three quarters of the Earth's surface but only 3% of it is fresh water. Of this 2% is found in ice caps and glaciers and 1% in underground sources, rivers, streams, lakes and the atmosphere. However due to numerous factors, fresh water has become and is being seriously depleted worldwide. Countries all around the world, including those whose rainfall was, until only recently very high, are experiencing drought. Millions of lives are being lost and many are suffering from severe conditions due to it. Mountain regions cover approximately 25% of the Earth's land surface and source between 60% and 80% of Earth's fresh water. All of Earth's rivers have their headwaters and origins in them. They are also known as the 'Water Towers' of the world. They provide critical storage of fresh water in the form of glaciers, ice and snow. Many streams and rivers would cease to flow entirely if their headwaters and watersheds were not fed by the seasonal melting of these snows. Such valuable storage of fresh water is vital for all life on Earth. However nowadays glaciers and mountain snows are retreating, shrinking and thinning rapidly in all regions of world, threatening the fresh water and food supply for all.

Unlike resources such as coal, oil and gas the fresh water system is a renewable and regenerative one. It has the ability of being replenished. Nonetheless this cycle is

utterly dependent upon indigenous mountain forests and plants. These forests play a major role in protecting the watersheds, which all rivers depend upon. However, worldwide too much of these indigenous forests have been cut approximately 28% of the world's forests were indigenous mixed mountain forests. Humanity cut it by 75% globally. Approximately 21% of the world's forests were therefore cut and destroyed. This was largely replaced by, monoculture pine plantations, for fast profit. These are lethal to the majority of other plants and local biodiversity. They also do not do the necessary job of precipitation. Mixed deciduous mountain forests play a vital and crucial role in the hydrological cycle. Due to their massive loss, glaciers and mountain snow cannot be adequately replenished. Temperatures rise as the solar reflector is diminished and thins. This factor is almost invisible and has mostly been disregarded when talking about reasons for 'Global Warming'.

An understanding of mixed forest in mountains and its protection and fast regeneration is vital in achieving any of our goals for long-term sustainability and equity. To protect and regenerate Earth's fresh water cycle these indigenous forests need replanting on a vast scale throughout mountain regions worldwide imminently. Without adequate mixed deciduous forests in mountain regions the fresh water cycle and temperature regulation mechanisms cannot be maintained and if not remedied will break down regardless of all other actions. If all the forests worldwide were saved and regenerated and the mountain regions were ignored they would all die of drought as glaciers and mountain snows disappeared and rivers dried up. We at Active Remedy Ltd believe that all indigenous mountain forest needs to be protected and that 25% of mountain regions worldwide need replanting with mixed indigenous mountain forest as a matter of urgency for global environmental stability.

We have formulated a method for doing this. It is a combination of several modern and traditional conservation techniques that address the diverse requirements of this challenging task. The principal is to create many community managed forest patches, within close proximity to mountain communities and to link these with green corridors. Thus creating a network by which biodiversity can spread over great distances, in a short period of time and with minimum resource expenditure. The green corridors would consist of mixed plants, specifically chosen for their environmentally beneficial properties. These corridors could then also provide resources and cottage industry opportunities for local communities. This is a way of working in a supportive manner with local mountain communities, recognizing that they play a fundamental role as stewards of natural resources that maintain global stability. This could be a way of joining many diverse groups and communities together in an interconnected endeavour, for the common purpose of safeguarding environmental sustainability. Nowadays many factors need to be seen in relation to one another for us to take appropriate action and bring about truly lasting advantageous results.

Traditional Knowledge and Forest Management Practices for Sustaining Life on Earth:

The sustenance of the incredible variety of species and biodiversity on planet Earth throughout millennia has been largely dependent on the abundance of water that exists here. Water covers more than three quarters of the Earth's surface but only 3% of

it is fresh water. Of this 2% is found in ice caps and glaciers and 1% in underground sources, rivers, streams, lakes and the atmosphere. For the majority of life to exist fresh water is absolutely essential.

However due to numerous factors fresh water has become and is being seriously depleted worldwide. Countries all around the world, including those whose rainfall was until only recently very high are experiencing drought. Millions of lives are being lost and many are suffering from severe conditions due to it. .

It has been recognized and confirmed that people living with water scarcity is expected to climb from 1.7 billion to 3.2 billion by 2080 (IPCC, 2008). It could also be much higher, depending on the compounding of factors involved in the rate of glacial retreat and breakdown in the global hydrological cycle.

When considering fresh water it is vital to consider mountain regions. They play an extremely crucial and irreplaceable role in the hydrological processes of the planet and in the regional hydrology of all continents (Roots and Glen 1982).

Mountain regions cover approximately 25% of the Earth's land surface and source between 60% and 80% of Earth's fresh water (U.N General Assembly 29/9/05). All of Earth's rivers have their headwaters and origins in them (Viviroli et al. 2007). They are also known as the 'Water Towers' of the world. (Bandyopadhyay 1995). They provide critical storage of fresh water in the form of glaciers, ice and snow, which melts and is released during warm seasons. Many streams and rivers would cease to flow entirely if their headwaters and watersheds were not fed by the seasonal melting of these snows. Such valuable storage of fresh water is vital for all life on Earth (UNCED 1992 Agenda 21). They are also important in the interception of air circulating around the globe, by forcing it upwards where some of it condenses into clouds and returns to earth again as rain and snow.

"Water is essential to human life, and healthy mountain ecosystems are essential to global water supplies. By taking care of the world's mountains, we help to ensure the long-term survival of all that is connected to them, including ourselves"
(Douglas McGuire, head of FAO's Mountain Group).

Mountains and the Regulation of Global Temperatures:

Apart from the fundamental and vital part that mountains play in maintaining the regenerative fresh water cycle they play a major part in the regulation of Earth's temperature. Their snow, ice caps and glaciers form a powerful solar reflector, which very much affects the regulation of Earth's overall heat. Nowadays glaciers are retreating, shrinking and thinning in all regions of Earth (UNEP WGMS 2008) and the degradation of permafrost is accelerating. This is very likely to have significant effects on water available for both mountain and downstream communities worldwide (Stern et al. 2006). As they melt and become thinner this function naturally becomes less effective, greatly influencing rising temperatures upon Earth and adding to global warming. This also leads to glacial lake outbursts and land slides, which disrupts the

amount and timing of fresh water released to all rivers and lowlands, causing problems with its quality and quantity.

“In the greater Himalayas, a substantial proportion of the annual precipitation falls as snow, particularly at high altitude (above 3000m). In the higher reaches, snowfall builds up from year to year to form glaciers that provide long-term reservoirs of water stored as ice. The high Himalayan and inner Asian ranges have the most highly glaciated areas outside the polar region” (Dyurgerov and Meier 2005).

Nowadays they are not being replenished as fast as they should be. Rapidly retreating glaciers and mountain snows swiftly wastes the supplies of fresh water available and needed for all life. This scenario threatens the fresh water and food supplies for hundreds of millions, if not billions of people, along with all life on Earth (UNEP WGMS 2008). When this ice melts, some of it evaporates thus increasing the quantity of water vapour in the atmosphere.

Water vapour H²O is a very powerful greenhouse gas, which normally stays in the atmosphere for around nine days. However if it is not brought to Earth through precipitation, it rises into the upper atmosphere and increases the problems of the greenhouse effect and exacerbates Global Warming (Santer 2007). It has also recently been proven that the ice and snow on the high Himalayas regulate the climate for the entire Northern Hemisphere (Zhang Yongze).

Hence wherever we live in the Northern Hemisphere the great glaciers of the Himalayas affect our climate and ecological environments. In a similar manner the Andes affect the climate of the Southern Hemisphere. If this situation continues, it is possible that glaciers may completely disappear from many mountain ranges within the 21st century.

“The 15 000 Himalayan glaciers that create the “Water Tower of Asia” —the largest block of fresh water outside the Polar Ice Caps—have been melting forever. But they are suddenly melting so fast that they are drying up. It will take decades, but at the rate the earth is warming, they may simply disappear” (Schiffrin 2008).

Understanding the Science of the Water Cycle:

Unlike many resources such as coal, oil and gas the fresh water system is a renewable and regenerative one. It has the ability of being replenished through a combination of natural processes and the passage of time. However it can only be renewed through the process of the water cycle, where water from seas, lakes, rivers, and dams evaporates, forms clouds, and returns to earth through precipitation. This cycle is utterly dependent upon indigenous mountain forests and plants.

“The availability and especially the quality of water are strongly influenced by forests and thus depend on proper forest management” (FAO 2007).

Approximately 28% of all forests on Earth are found in mountain regions. Through their action of precipitation and transpiration they play a crucial role in the creation of rain, snow and ice. Precipitation is the process by which water molecules H_2O in the air form rain and snow and fall to Earth. This occurs in relation to a combination of different factors, particularly when plants and trees are present, especially deciduous species. Deciduous trees such as oak release large amounts of a powerful hydrocarbon, known as isoprene into the atmosphere. Worldwide, plants release more than 550 million metric tons of the hydrocarbon isoprene into the atmosphere each year (FAO 4 September 2006, Rome). Isoprene breaks down into a compound called dihydroxyepoxide. This is very reactive and forms multitudes of bio-aerosols. These act like a vacuum cleaner of the atmosphere and are an essential factor in cloud formation (F Paulot et al 2009).

It is possible that the formation of clouds at high altitudes would not be possible without them. Even young oak trees produce this chemical and it is worth noting that the oak species is one of the main indigenous trees of the Himalayas. However, because it is slow growing and quite fragile when young, it needs the support of numerous other plants and trees to be able to take root and survive, especially in seriously eroded areas.

Another factor in precipitation is known as ice nucleation, whereby bacteria produced by plants and which live on the bark and leaves of plants are blown into the atmosphere. These form the nuclei seeds around which ice crystals form. Snow and most rain begin with the formation of ice in clouds. As mountain forests disappear there is less precipitation and transpiration, hence less snow and rain at high altitudes is made, land drains more quickly and soil temperatures rise.

The protective function of healthy mountain forests, full of biodiversity, also provides the groundcover and shade needed to delay snowmelt and reduce evaporation from the soil. These actions are vital for the safeguarding of all watersheds, which in turn maintain the stability of all rivers and water tables (*Bishkek, Global Mountain Summit. 2002*). They also play a vital role in ensuring the quality and quantity of rivers and streams by preventing and reducing slope and soil erosion (U.N General Assembly 29/9/05). The root systems of indigenous mountain forests are responsible for both holding loose soils together and in channeling fresh water into the underground aquifers and water tables, so renewing many ground water sources. If they are not present this necessary action cannot take place and springs and wells thousands of kilometers distant from them, dry up and disappear.

The recharging of groundwater resources are closely linked to the renewing cycling of fresh water, through which aquifers and underground sources are periodically replenished. However its regeneration is dependent upon sufficient precipitation. Between 1.5 billion (UNEP 1996) and 3 billion people (UN/WWAP 2003) worldwide are dependent upon groundwater supplies. These forests form a major part of the natural infrastructure, which protect watersheds and all fresh water sources. However it is possible that only 25% of the Earth's primal indigenous mountain forests are still intact (Maggio, Gregory F. and Owen J. Lynch. 1996). This implies that 75% is missing. This is approximately 21% of the world's forests. It is an enormous loss and surely adds to the problems of global warming; considering that these forests are the

natural mechanism, which plays a vital role in the making of mountain snows and replenishing glaciers, thereby regenerating the global fresh water cycle. Through the wide mixed variety of plants and trees they would also be producing oxygen and absorbing CO² at high altitudes. Some indigenous mountain plants are very fast growing and have very high oxygen producing capacities. Also it is generally assumed the rise in green house gas is mostly caused by burning oil and gas yet according to the U.N:

“Between 25% and 30% of the greenhouse gases released into the atmosphere each year – 1.6 billion tons – is caused by deforestation” (FAO 4 September 2006, Rome).

Mountain cloud forests are particularly valuable for their capture of water that is combed from mists and moving clouds. They are also of immense importance in maintaining a steady supply of fresh water to all the lowlands and downstream areas (Hamilton, L.S. 1996). The deforestation of high-altitude forests negatively affects watersheds and ecosystems downstream. The health of entire watersheds can depend on preventing environmental degradation in these areas. In South America, the loss of Andean cloud forests has upset the hydrological cycle and exacerbated landslide and flood damage related to El Niño (FAO (2007). This has serious effects on climatic conditions throughout the entire Southern hemisphere.

If approximately 25% of Earth's land surface is upland mountain regions then that indicates that approximately 75% of Earth's land surface is downstream lowland regions. Whether close or distant all of life on Earth is affected by the health and environmental stability of mountain regions. Even life in the oceans is dependent upon them, as the fresh waters from rivers finally feed into and clean them. Without a steady flow of clean fresh water the oceans become too high in salts and hence too imbalanced to adequately support marine life.

“Healthy mountain ecosystems are the foundation of healthy people, both in the mountains above and in the plains below. To save civilization, there is no greater urgency today than to regenerate and conserve our mountains. “Their role in regulating our climate and water systems is fundamental to the sustenance of our life on this planet”(Dr Ashok Khosla, Lucerne World Mountain Conference 11/10/2011).

This almost looks like an impossible situation but it is not necessarily so. It becomes plausible if we take action imminently in relation to the vast store of knowledge that we presently have. Undoubtedly we will acquire more in the process but right now we have sufficient knowledge and resources to proceed and potentially succeed. Nature on Earth is comprised of multitudes of interdependent and interconnected ecological systems and life forms. It is incredibly resilient and vastly intelligent. If we can view Nature from this perspective, we have more chances of working in harmony with it and of solving problems related to it and ourselves. We are after all part of this interrelated natural world and have immeasurable intelligence and capacities when our minds are combined in a common focus for the benefit of the whole. All lives are threatened, so it is in everyone's best interest to join forces and become part of the solution. Much can yet be achieved if we take the necessary

precautionary actions required to avert and mitigate crisis before they are too overwhelming and unavoidable.

If we can understand what is happening with the vast system that sustains us and why, then we can naturally progress from this knowledge to understanding how to solve it with methods that complement the system, harmonies with it and open up its own strengths and resources, including human ones, to help its recovery. Just as problems are seldom isolated but are interconnected so can solutions be. Therefore fixing one issue can naturally harmonies and produce excellent results for others.

From this knowledge it becomes transparently obvious that to protect, re-balance and increase the natural regenerative system of the fresh water cycle, indigenous mountain forests need both protecting and regenerating as fast as possible worldwide. To help solve the problem of too much water vapour remaining in the upper atmosphere and adding to the greenhouse gas crisis, it is necessary to establish fast growing, high precipitating, indigenous forest plants throughout mountain regions worldwide as soon as possible. Time is of the essence as mountain areas are very fragile.

They are particularly vulnerable to changing climatic conditions due to their altitude, steep slopes, shallow soils widely varied, extreme climatic conditions, and geological variability. They are one of the world's most sensitive ecosystems (Sonesson and Messerli 2002). Due to the vast deforestation and non-sustainable monoculture projects, which have occurred on an enormous scale globally, their soils are very depleted and erosion problems are massive. Often monoculture pine is invasive and wipes out other species in an area. It also does not do the necessary job of precipitation at the levels required and needed.

Repairing the Roof of the World:

If we consider the Earth as a home that is comprised of many floors and rooms, 'The Roof of the World' would be all of the Earth's mountainous regions. If the roof becomes destabilized, the rest of the house is undoubtedly threatened. We all have some awareness of what happens in a house if the water tank stops working.

The survival of virtually all life upon Earth is utterly dependent upon the services that mountain regions provide. Globally they form an interdependent integrated system and need to be regarded along with fresh water as 'Global Common'.

It is important to recognize that the collaboration with mountain communities is crucial and essential for the effectiveness of this undertaking. It is only by involving and supporting them that an endeavour of this magnitude can be successfully achieved and prove to be long-term sustainable, thereby supporting all life.

Mountain communities have developed conservation practices over long periods of time. These are based on well-founded observations that document the most effective methods to sustain the local resources. They have been passed through the

generations even into present times (Ohmagari and Berkes, 1997). Mountain people are the natural stewards of the water sources and mountain resources essential for all the lower lands of Earth. Therefore they should be encouraged and supported for their services in regenerating and protecting their environment. Without the recognition of the vital part that they play in being the natural caretakers of the mountain forests, they will be forced by poverty to either degrade these resources even further or to migrate. However if these communities are supported, they can provide the very important service of regenerating, safeguarding and preserving the natural ecologies.

It is important to remember that supporting these mountain communities is not simply an act of charity. It is a means by which all lowland communities, including wealthy urban ones can safeguard their own long-term interests. It is also important to note that generally it has not been the grass-root communities that have caused the majority of the environmental degradation that has taken place in these areas. It has always been in the interest of these communities to protect the natural resources, which supported their livelihoods. However now those natural resources have become so scarce, the daily necessities of the local rural communities also threaten them.

“Logging, both illegal and government-sponsored, dam construction in areas of high seismic activity, and inappropriate reforestation programs are responsible for far more damage than that caused by so-called ‘ignorant’ subsistence mountain farmers” (D.Knight 2002)

Supporting and educating rural mountain communities are a fundamental part of the method that we are proposing. However it is important to understand that we also need to be educated and that they have vital ancient traditional knowledge, as well as specific local understanding that we are lacking. This is the time for indigenous and modern knowledge systems to be integrated and for us to form mutually respectful alliances with one another. Uniting, supporting and sharing knowledge is the only way we can possibly deal with and overcome the crisis threatening the well being of all life on Earth.

"Indigenous cultures, traditions and knowledge, including in the field of medicine, are to be fully considered, respected and promoted in development policy and planning in mountain regions, and underlines the importance of integrating indigenous knowledge, heritage and values in all development initiatives" (U.N, 2006).

We at Active Remedy Ltd have spent a number of years researching and communicating with many knowledgeable people including those from mountain communities, about the scale of the problems regionally and globally and methods, which could be applied for helping to solve them. From detailed research, it appears to be essential to reforest approximately 25% of Earths mountain regions with indigenous mixed forest plants within the next thirty years and to protect the indigenous mountain forests presently in existence. In order for them to be effective and successful they need to be comprised of many mixed indigenous plants, which enrich and support the local biodiversity. This would conceivably enable the natural ecological and hydrological systems to re-balance themselves and survive indefinitely.

The method that we propose for doing this has been formulated considering both modern and traditional conservation techniques, which have proven themselves to be successful. It could be considered as repairing the 'roof of the world'. It has been created specifically to fit with the requirements and traditions of the different social groups and terrains throughout mountain regions worldwide. We have integrated the methods of sacred groves and green corridors along with Permaculture, forest gardening, companion planting and cottage industry scale cultivation of medicinal plants to create a model that could have the potential to cover all the requirements for the difficult task of Global mountain reforestation. We have termed this method 'The sacred grove and green corridor method for repairing the roof of the World'.

It is important to understand that in proposing this solution and claiming it to be viable and sustainable we do not in any way underestimate the scale and magnitude of the problem we describe here.

Restoring new mountain forests is a very difficult job when the old forests have been severely diminished and when there is very little topsoil remaining, leaving behind arid lands. This also applies when the remaining soil is too acidic or compacted. To grow a new forest in these conditions, one has to re-establish the complex root structures and canopies, to resemble that of a mature forest. Young trees cannot be expected to grow in bare, exposed land. They are too fragile and vulnerable. They need shelter from the harsh weather conditions such as strong winds, heavy rains and intense sunshine, which are common to mountain regions. There are certain plants, indigenous to all mountain regions of the world, which possess properties that can be utilized to solve many environmental problems (FAO.2001). Between the rich varieties of species are many plants potentially capable of providing all that is needed for re-establishing indigenous mountain forests fast.

Some of these plants are capable of growing in some of the most badly eroded and degraded soils (Dhar, 2002). There are also some, which are capable of cleansing the land by removing toxins. This process is known as phytoremediation. This is a way of using plants to clean up pollution in the environment. Certain plants can help clean up many kinds of pollution including metals, acids, pesticides, and oil. (Mark, 2003). These plants can also help prevent wind, rain, and groundwater from carrying pollution away to other areas (Shimp, et al, 1993).

Amongst these mixed indigenous mountain region plants, there are some, which have strong, fast growing root systems. These are capable of holding together the loose earth, so allowing other, slower growing plants such as oak, to connect their tender roots in with a strong web of roots. This root system helps to prevent land erosion and the loss of moisture by holding the soils together on the slopes. Using a combination of fast growing plants, it could be possible to synthesize a natural forest. This would act like a nursery for the young plants and make it possible to introduce many varieties, so encouraging high levels of biodiversity. These kinds of considerations make it conceivable for young plants to be able to establish themselves and become forests relatively fast. Speed is of the essence and of utter importance in this endeavor. Every time heavy rains fall precious soil is washed away.

Once an area becomes rock, it is no longer possible to introduce plants and all that is left is arid land and desert. Some of the environmental problems being faced have occurred due to the introduction of foreign plants and monoculture into a given area. Although many foreign plants may have some useful qualities, too often they have proven to be invasive and have wiped out local plants, which are vital for the health of the overall general environment. Therefore, the plants, which have already evolved in local environmental conditions, are the ones that would be the most beneficial and successful for fast land reclamation and regeneration. In this respect mixed indigenous companion plants are vital for a successful outcome

When searching through the traditional methods that the mountain communities have applied to preserve the environment, we came across the tradition of 'Sacred Groves'. These are small, forested areas conserved by the local people, which are intertwined with their traditional, cultural and religious practices. They still exist in many countries around the world (*Hughes and Chandran, 1997*). They have proven themselves to be storehouses of valuable medicinal plants and biodiversity, which have many land and water preserving properties. These groves enhance local environmental and cultural wealth. They are similar to temples but with the main emphasis being on the sacredness of the nature in the grove and not on a building.

It is an ancient conservation method that many mountain communities are familiar with and still adhere to. Because it is still a living tradition from ancient times it has a natural vibrancy and potential (Gadgil M. and Vartak V.D. 1975).

The method that we have formulated involves the creation of new sacred groves and the preservation and restoration of existing ones. Numerous new small groves would be created throughout the mountain regions, linking village communities and creating networks across these areas. Each grove could be planted in such a way, as that every village had a five to ten acre grove within its vicinity. By linking new groves with existing ones; the latter already being significantly important for local communities, would mean that these communities would feel more devoted and protective towards the new ones. This would be a way of uniting the old and the new together and would therefore give these groves greater cultural stability. Each village could potentially form a local group to care for, manage and be stewards of these new groves and be funded to do so. Because this tradition has been global it has the capacity to potentially fit with many different cultures, landscapes and situations.

These newly established groves could range from religious groves of any faith, to simply being naturally beautiful, peaceful and invigorating forest gardens and peace parks. They would generally be community managed and so bring members of local communities together through education and mutual effort. Involving children and students in this could be a very good way of educating them about the benefits of conservation, from a young age. In this way fast, active, community based programs could be initiated and set into motion. It has proven itself to be effective in the past and is still so in present times, in conserving natural environments. Hence it could be highly valuable when forming a workable model for regenerating and preserve indigenous mountain forests and supporting mass biodiversity.

“A scientific understanding of the sacred groves would be significantly important for designing strategies for rehabilitation of degraded landscapes, involving local people’s participation, and training for promotion of traditional and social norms”

(Gadgil and Berkes, 1991).

The long-term sustainability of these new sacred groves would be greatly amplified, if created in combination with the cultivation of different kinds of medicinal plants for cottage industry. This cultivation would preferably take place outside of the groves, in designated strips of land linking the individual groves. They could even potentially serve as important green corridors/belts between larger, officially protected areas such as national parks (*Hughes and Chandran, 1997*). Green corridors and belts have proven to be very effective in the reclamation of severely, environmentally damaged landscapes throughout a number of countries in recent years and have proven to be a way which enables much biodiversity to spread and flourish. (*M. Malagnoux, E.H. Sène and N. Atzmon, 2007*). Isolated and fragmented forest systems have proven to be less effective in supporting wildlife and stabilizing soils. This is because isolated patches of biodiversity and local preservation do not have a very large environmental impact on a global scale. Mixed indigenous plant species could be selected for their environmental restorative and useful properties. Local communities could cultivate plants that they specifically need for providing medicines, fodder, foods and fibre within these green corridors. These could conceivably become local resources that support the needs of the communities, bringing them means of establishing local co-operative cottage industries and employment. In such a way green economies and gender equality would naturally come about and flourish. The Green Belt Movement’ in Kenya founded by Wangari Maathai, has facilitated in the planting of approximately 30 million trees. By planting trees in groupings of 1,000 or more, these green belts have begun to reclaim the ecosystems of Kenya that were rapidly eroding.

CONCLUSION

“Where there are threats of serious or irreversible damage; lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation” (UNCED, 1992 Principle 15).

One way to support and restore biodiversity is to give local communities the right to protect and manage it. This gives a direct bond and attachment between them and the surrounding environment and can help to secure their support for the project. It would also provide a means of linking mountain communities throughout large areas of mountainous regions and even the world.

“Due to an increasing demographic pressure on the earth’s ecosystems, the demand on mountain resources (e.g. on water) will increase in future and the potential for conflicts over their use will grow. To avoid severe conflicts as well as to conserve and sustainably develop one of the most precious environments on earth, it is crucial to improve the management and protection of mountain ecosystems, to deepen observations as well as to link networks.” (Terrestrial Ecosystem Monitoring Sites)

It is very important that the interaction of different communities, cultures and knowledge systems from around the world takes place. Our ancestors were fully aware that the natural resources that sustained them must be conserved for the sustenance of future generations. This deep connection between protecting the biodiversity and protecting the ancient rituals and traditions has meant that there are still many beautiful examples of both of these in the present day. It has already been recognized that:

“Indigenous cultures, traditions and knowledge, including in the field of medicine, are to be fully considered, respected and promoted in development policy and planning in mountain regions, and underlines the importance of promoting full participation and involvement of mountain communities in decisions that affect them and of integrating indigenous knowledge, heritage and values in all development initiatives” (U.N 2006)

The welfare of all species, communities and groups can only be maintained and improved if there is ample fresh water. The success of this is in every ones best interest. This is a time for diverse communities to work together in an interconnected manner for a common purpose and could be a way whereby many seemingly unrelated governments, organizations and individuals could join together in a concerted effort, to support a common global program for the benefit and greater good of the whole. Nowadays many factors need to be seen in relation to one another for us to take appropriate action and bring about truly lasting advantageous results.

“Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.”
(UNCED 1992 Agenda 21, Principle 1)

This work need not be overall expensive. Using a small percentage of the resources we have now, to potentially save the whole for an indefinite span of time could be considered a worthy investment. This is a global long-term defence strategy. 1% of the defence budgets of all countries in the U.N could conceivably cover the expense.

“Those sharing in the benefits of mountain resources should also share in the responsibility for their sustainability” (FAO 1997)

Millions of lives are being lost and many are suffering from severe conditions due to the break down in the global fresh water system and drought related to it. This will become incalculably worst if a globally connected action plan is not implemented. Once the scanty soils in mountain regions have gone and only rock remains it is impossible to plant forests regardless of how much energy is focused upon them. Even now it is a demanding task but still within the realm of possibility. The evolution of nature including humanity has shown itself to be incredibly adaptive and has survived many adverse conditions but we cannot adapt to virtually no fresh water.

Regardless of status or species all life is presently threatened by this same problem and unless solutions are found and applied, life and evolution on planet Earth may come to an abrupt end. Rather than ignoring or running from this threat, as there is

ultimately nowhere to run to, it would be to our best advantage to face it, understand it and use our best intelligence and resources to work on remedying the problems while still conceivably possible.

It is crucial however, that it is acted upon without delay.

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TRADITIONAL KNOWLEDGE AND FOREST RESOURCE UTILIZATION: PRACTICES OF THE KARBI TRIBE OF NORTHEAST INDIA

Kh. Narendra Singh

ABSTRACT

Traditional knowledge has played, and still plays, a vital role in the daily lives of the vast majority of people. Traditional knowledge is essential to the food security and health of millions of people in the developing world. Traditional Knowledge is a broad term referring to knowledge systems, encompassing a wide variety of areas, held by traditional groups or communities or to knowledge acquired in a non-systemic way. The Director General of United Nations Educational, Scientific and Cultural Organization (Mayor, 1994) defines traditional knowledge as “The indigenous people of the world possess an immense knowledge of their environments, based on centuries of living close to nature. Living in and from the richness and variety of complex ecosystems, they have an understanding of the properties of plants and animals, the functioning of ecosystems and the techniques for using and managing them that is particular and often detailed. In rural communities in developing countries, locally occurring species are relied on for many - sometimes all - foods, medicines, fuel, building materials and other products. Equally, peoples knowledge and perceptions of the environment, and their relationships with it, are often important elements of cultural identity”.

Keywords: Traditional knowledge, Cultural Organization, environments, ecosystems

INTRODUCTION

The northeast India is unique due to its diverse culture and ethnic groups with traditional cultural systems and survival strategies based on local resources in its surrounding environment. It is one of the most diverse areas of Asia in terms of illustrating the relationship between man and environment throughout the ages. The northeast India contain more than one-third of the country's total biodiversity. The region is also rich in terms of genetic and ecosystem diversity. The topography and ecology of the plains and hills have influenced almost every sphere of the life of the people. The exhibition is the reflection of life and culture of north east India. It is a multi thematic exhibition showcasing the harmony of body mind and soul, material, technique, art, energy, harmony between grace and power, beauty and utility - through the representation of indigenous games, hunting agriculture and fishing implements. Objects made of bamboo, cane, clay, stone, various headgears and other items for everyday use. The rich textile of the region has been exhibited and also the anthropomorphic physiognomy of the characters of the folk narratives through the paintings by native artists.

A wide variety of man-modified ecosystems such as *jhum* (one way of shifting cultivation) agro-ecosystem and wet rice agro-ecosystem contribute towards the rich ecosystem diversity. About three quarters of the northeast India is covered by hilly terrain and one quarter is made up of the four plain areas of Assam's Brahmaputra and

Barak valleys, the Tripura plains, and the Manipur plains. The region is well-known for its diverse flora and fauna, medicinal plants, minerals like oil and natural gas, coal, limestone etc. and forest wealth, land use patterns and traditional knowledge base.

All societies have custom specifying how people gain access to natural resources, customary ways of transforming or covering those resources, through labor, into necessities and other desired goods and services and customs for distributing and perhaps exchanging goods and services. (Ember, 2007:300). Forests are an important source of food, fibre, freshwater and construction materials for subsistence as well as cash income for the tribal people and act as 'safety net' in times of hardship (Wollenberg and Ingles 1999, Campbell and Luckert 2002). Traditional ecological knowledge in forest management practices is attracting greater attention of late because if it is combined with scientific knowledge, it can play a far greater role in sustaining biodiversity and ecosystem services as well as increase forest productivity (Becker and Ghimire 2003).

The present paper attempts to study the traditional practices towards utilization and interdependence of forests resources of the Karbi tribe.

About Karbis

The Karbis are one of the important tribes scattered in North East India with a major concentration in the central part, in the Karbi Anglong district of Assam. They are also found in the neighbouring states of Nagaland and Meghalaya. It is believed that the Karbis used to have lived on the banks of the rivers Kalang and the Kopili and in the entire Kaziranga regions, where the famous national park of Assam is situated. K.L.Barua (1933) opines that the Karbis had perhaps migrated to the northeast India after the Austro-Asiatic Khasis entered the region, but before other Tibeto-Burman groups settled there. Bordoloi (1985) states that the home of the Karbis was western China near the Yang-te-Kiang and the Howang-Ho rivers. They came down to the Chindwin and the Irrawady rivers, entered Burma (now Myanmar) and stayed there for some time.

According to 2011 census Karbi Anglong district has a population of 265,280 with 493,482 males and 471,798 females. The district has a population density of 93 inhabitants per square kilometer in 2011 compared to 70 inhabitants per square kilometer in 2001. The total area under Karbi Anglong district is of about 10,434 sq. km. with dense tropical forest covered hills and flat plains with numerous rivers and streams. The district can be broadly divided into two physiographic units viz. hills and plains. About 85 percent of the district is covered by the hills. As per the State of Forest report 1999 of Forest Survey of India, Dehradun, 6044 Sq. Km of the district are under dense forest cover while 2776 sq. km are under open forest cover. The important forest types found in Karbi Anglong district are:- a) Moist semi-evergreen forests, b) Moist Mixed Deciduous forests, c) River-rain Type and d) Miscellaneous type with scattered pure or mixed patches of bamboos.

The livelihoods of the Karbis are depending on the forest based natural products and collect their foods from their surrounding forest. Slash and burn or shifting

cultivation, is a way of life in hilly areas and it is one of the most widespread types of cropping and is directly supported by the forest ecosystem. Basically, the shifting cultivation system is a reflection of the relationship between man and environment in the tropical mountain region. It has been in use for centuries and still remains a major land-use practice, providing the basis for subsistence farming, maintenance of cultural values and social stability for the people living in low population densities of Northeast India (Aier and Changkija, 2003: 367). The majority of the tribal populations of northeast India even today practice simple shifting cultivation. In Assam shifting cultivation is practiced over more than 5 lakhs acres of land and it is allowed all over the forest excepting the reserved forests. The Jhum cultivation is prevalent among the Karbis particularly those who lived in hilly terrain. The economic systems of the Karbis are closely interconnected with the ecology.

The Jhum Cultivation and the Karbis

The Jhum cultivation is called *inglong arit* by the Karbis and they have learnt this very art of Jhum cultivation from their ancestor and practicing since time immemorial. The socio-economic conditions of the Karbis are closely interconnected with culmination of Jhum cultivation. It is also the breeding ground of their folk song and dances. The rich culture and literature of Karbis are the outcome of the great assimilations of the lifestyle of the thick jungle, the habitat of style of life which could be best understood in context with nature man spirit complex (Vidyarthi, 1963).

Jhum cultivation season begins from the middle of February or the beginning of March when the *jhumiyas* began to cut down trees of the hill slopes to be used as jhum field called "*Rit Kepan*". Next phase is burning of the dry materials called "*Me-kekai*" and is followed by complete clearing of the areas as well as preparation of the soil with helps of hoes. After having prepared the soil the seeds of the cereals are broadcast. This is done during the month of April -May when the summer rainfall begins. The major crops grown are rice, maize, cotton, Pumpkin etc. When the paddy seedlings attain some height, the process of weeding begins, throughout the growing season the paddy and other crop are nurtured and protected from wild animal like monkeys, wild pigs, elephant, birds etc. Paddy is harvested generally during the months of September – October.

The main feature of shifting cultivation is that agriculture is confined to small feature areas and mainly restricted to the village. The land is cleared with the aid of fire, the cleared area are cultivate with crude method for 2-3 years of the *jhuming* and abandoning for 5-10 years and then again clean up. The main crops of the *jhuming* in the Karbi hills include rice, yam, maize, cotton etc. The Jhum is a low yielding cultivation, and sometime the crops produced were not sufficient enough for the family.

The major stages for jhum cultivation.

- 1) **Selection of Cultivation Site:** At the initial stage of jhum cultivation a suitable site for cultivation is selected. The headman of the family or any adult member of the family goes to the forest for selection of site for jhum cultivation. A suitable plot

of land is generally selected and a mark is given signifying to be reserved by him for cultivation.

- 2) Preparation for Cultivation Site: After selection of site, one has to cut all the plants including bamboos, trees and other unwanted plants at a time so as to dry them up completely. The clearance of jungle is to be done in such a way that none of the trees and plants can grow and destroy the grown crops. After cutting the trees the farmer used to burn of his crop field into ashes so that seeds are properly sown in the field and the sown crops are grown properly.
- 3) Sowing of the seeds: After preparation of site for cultivation, soil is prepared for sowing the seeds in the field are done by all members of the family including young boys and girls.
- 4) Uprooting unwanted herbs and shrubs: At this stage, all the crops are grown and the field becomes quite green, and the farmer used to up root the unwanted herbs and shrubs.
- 5) Harvest and reaping: This is one of the most important period of Jhum cultivation. The crops are collected from the field and store at a place called 'Mandu'. After collecting from the field, the boys and girls carry the crops to a suitable place to keep the crops safely called 'Ingkro' where they can store for the whole year.

Jhum cultivation today among the Karbis has been changing and they started using modern technology, hybrid crop seeds, chemical fertilizer, pesticides and well irrigations etc. which boost-up productions and income of farmer substantially in the short run. However, the indiscriminate used of fertilizers, pesticides and other chemical would cause adverse changes in biodiversity and biological balance and would lead to an increase in the incidences of a numbers of ailments, deformities and diseases. Therefore, sustainable development of agriculture without causing detrimental effects on natural resources, ecology and environment and health of living organism form the major plant of new agricultural policy paradigms' such that the production system itself provides sufficient resilience to support life, maintains soil fertility and productivity besides conserving natural resources.

Significance of Bamboo in the Karbi material culture

Material culture refers to the technology and material artifacts, the objects produced by human beings, including tools, weapons, utensils, furniture, art, and indeed any physical item created by a society. Bamboos are one of the notable economic and cultural significant of the tribes of northeast and are being used for household building materials as well as food source, household implements, weaving implements and for rituals as a versatile raw product. Bamboo is the 'green gold' of northeast. It is a natural element of sustainable, integrated farming system and an excellent resource on which to build a variety of income and employment generation opportunities.

Bamboo is very popular among the Karbis and plays a significant role in their culture. Many household items are prepared from bamboo that includes i) hand fan (hijap); ii) basket for keeping rice and vegetables, iii) Belenk : It is a round bamboo winnowing tray for cleaning rice and paddy, iv) Hak kengdo: It is made up of bamboo

having four legs and rope for carrying and is mostly used during the time of puja to carry wine. The typical Karbi houses are made up of bamboos. The bamboos are mostly used as house pillars (Nujok), walls (Arpong), roofs (sarnung) and door (inghap). Bamboo made musical instruments includes: i) Flute (Pongsi), ii) Violin like instrument (Kumli-eng) etc. As a food items bamboo shoots are widely consumed by the Karbis. Besides bamboo container is used for keeping purified water for use in rituals. The preparations of bamboo tools are not restricted to a particular person; rather it can be prepared by any persons who have the skill of the work. Generally it is observed that the male members of the family use to prepare such items. The raw materials are collected from the nearby forest as well as from the own cultivated areas. It is observed that the Karbi families cultivate bamboo for household use and at least two to three clump of bamboo can be seen in every Karbi family. Traditional garments of the Karbi women used to make by themselves and some of the materials which are use in weaving are made up of bamboo.

Handicrafts

Natural resources play a prime role in the economic pursuit of the Karbis. By using bamboo, locally available cotton, thread of wild plants, they use to prepare lucrative handicrafts and garments. They use to prepare traditional costumes like women clothes ‘pini’ and a belt ‘vamkok’, male jackets (choi hongthoir), bag (jarong), man’s turban (poho) etc. The locally prepared traditional garments play a dual role i.e, for their daily use as well as source of income. The instruments needed for spinning includes Honlam, Takari and Michongkret. Another implement called as Lithai is used for taking out the seed of cotton before spinning. They also furnish colour on the threads by using variety of fruits collected from the forest.

Besides, there are other major handicraft bamboo products for the Karbis that includes bamboo mats, baskets, agricultural implements Hand fan (*He-jap*) and other implements like for storage of large amount of paddy ‘Ingkro’; to carry firewood “Chatkang”. They also prepare several other items for keeping clothes, for drinking water, tea and wine etc. Wooden models of traditional Karbi houses and the traditional symbol of Karbi “Jambili athan” and different sculptures, masks, table mats and a number of other decorative items are quite popular and there is great demand for such items among the tourists and it is sold in the market in huge quantities.

Medicinal Plants and Health Care

According to the World Health Organization (WHO) as many as 80 percent of world’s population depends today on traditional medicine for their primary health care needs (Azaizeh et al., 2003). Recent decades have seen significant changes occurring within several aspects of ethnomedicine as a result of environmental degradation and tremendous changes in modern, social, and economic systems (Anyinam, 1995). Ethnomedicines are of particular relevance in developing countries like India, where modern health service is limited. In Indian Himalayan region (IHR), the number of doctors and other medical staff is very low in comparison to the total population (Sharma et al., 2001). The northeastern region is rich in medicinal plants. Medicinal plants are a vital resource for the traditional health care system. There is an increasing

focus on the importance of medicinal plants and traditional health systems in solving the health care problems of the world. Northeast India represents an extremely unique eco-system rich in medicinal plant. The medicinal plants also have traditionally engaged an important position in the socio-cultural, spiritual and medicinal arena of the people in the region. The Karbis are quite knowledgeable about locally available medicinal plants and depends on the ethno-medicinal plants naturally grown in the forest for treatment of most of their common ailments and diseases. They also consume some wild varieties of plants both as vegetables and medicine on a regular basis. The following table provides list some medicinal plants and its usage.

List of medicinal plants used by the Karbis.

| Sl. | Local name | Botanical name | Used for the treatment |
|-----|----------------|---------------------------------|------------------------|
| 1 | Chuselok | <i>Abrus precatorius</i> Linn. | Cough |
| 2 | Bapchuki | <i>Acmella paniculata</i> | Stomachache |
| 3 | Jok –an-kelok | <i>Adhatoda zeylanica</i> | Dysentery |
| 4 | Phrikangnek | <i>Alpinia galanga</i> | Bronchitis |
| 5 | Raeaba | <i>Alternanthera sessilis</i> | Skin disease |
| 6 | Hen saiku | <i>Amorphophalus bulbifer</i> | Piles |
| 7 | Ingchum | <i>Antidesma acidum</i> | Appetizer |
| 8 | Chamua | <i>Arisaema tortuosum</i> | Piles |
| 9 | Bengali dido | <i>Beta vulgaris</i> | Jaundice |
| 10 | Pri | <i>Calamus rotang</i> | Vitality |
| 11 | Bapduli | <i>Cassia tora</i> | Jaundice |
| 12 | Churu | <i>Chenopodium album</i> | Dysentery |
| 13 | Repichingthun | <i>Cissus quadrangularis</i> | Joint pain |
| 14 | Phelang-riho | <i>Clerodendrum serratum</i> | Wound |
| 15 | Kurveng | <i>Commelina benghalensis</i> | Earache |
| 16 | Tharmit tharve | <i>Curcuma amada</i> | Gastritis |
| 17 | Or -oh | <i>Cycas pectinata</i> | Gastritis |
| 18 | Kur-vengso | <i>Drymaria cordata</i> | Sinusitis |
| 19 | Ok hi atehang | <i>Homalomena aromatica</i> | Joint pain |
| 20 | Lopong brik | <i>Lippia geminata</i> | Conjunctivitis |
| 21 | Hewali | <i>Nyctanthes arbor-tristis</i> | Malaria |
| 22 | Nopak ban | <i>Oroxylum indicum</i> | Intestinal worm |
| 23 | Pharchingki | <i>Solanum nigrum</i> | Intestinal worm |
| 24 | Thebongkang | <i>Physalis peruviana</i> | Stomach pain |
| 25 | Rikang menthu | <i>Paederia foetida</i> | Gastritis |
| 26 | Vorke abap | <i>Vitex negundo</i> | Malaria |
| 27 | Parok hanthor | <i>Xanthium strumarium</i> | High blood pressure |
| 28 | Phrilangdung | <i>Zingiber zerumbet</i> | Blood dysentery |

CONCLUSION

Despite its rich natural endowment, northeast India suffers from socio-economic stagnation. There are several reasons for such a situation viz., topography, difficult terrain, ethno-political turbulence. More than eighty percent of the population of the region depends on agricultural economy contributing over forty per cent of the income

and employ about seventy per cent of the total working population. Among the hill population, a large size of them is marginal farmers with low capital input.

Traditional knowledge and practices have sustained the livelihoods, cultures and the forest and agricultural resources of Karbi tribes. This knowledge is firmly interwoven with traditional religious beliefs, customs, folklore and land-use practices, and have historically been dynamic, responding to changing environmental, socio-economic and political conditions to ensure that forest resources continue to provide tangible (foods, medicines, wood and other non-timber forest products, water and fertile soils) and intangible (spiritual, social and psychological health) benefits for present as well as future generations.

The understanding of indigenous knowledge and practices in relation to natural resource utilization and management is one of the key issues for achieving sustainable development of Karbis as well as for other communities of the region. There is a need to strengthen the forest conservation measures based on the traditional knowledge and value system. A comprehensive research studies needs to be carried out urgently to identify, document and study such practices for planning of sustainable resource management of the northeast region of India.

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UMARJHALA CLUSTERS AN IDEAL APPROACH OF FOREST MANAGEMENT STRATEGY FOR SUSTAINABLE DEVELOPMENT IN SOUTHERN RAJASTHAN: A CASE STUDY OF BANSWARA DISTRICT

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ABSTRACT

Deforestation is main cause of depletion of genetic diversity all over the globe. The main warning to this age is extinction of biodiversity; this threat is considered as a threat to civilization next to nuclear war. Umarjhala cluster is a good example of afforestation in this area. This afforestation unit is a larger unit of afforestation in Asia.

Micro planning and VFPMs were formed before starting afforestation in this area. First plantation was completed within two and half days (24-26 June -2002) in this cluster. Today this area has good number of natural and planted trees. Plants are planted as per requirement of inhabitant and ecosystem.

Socioeconomic status of surrounding inhabitants shows positivity of this anthropogenic forest ecosystem which is providing them their needful objects and economic benefits. Hand pumps, diesel pump sets, earthen bands and Grain Banks etc. were also provided to villagers by forest department. Some income generating activities are also going on in this cluster. 1301 families of VFPMs are benefited by NTFPs. Several local people also got employment under different schemes of afforestation of this area. Members of VFPMs are economically benefited from bamboo and grass from this cluster.

Keywords: Deforestation, genetic diversity, biodiversity, afforestation, ecosystem.

INTRODUCTION

Umarjhala Pathara comes under Ghatol range of Banswara district of southern Rajasthan (India). Forest land of this range is 20162.98 ha Total area of Umarjhala cluster (Block 1-19) is 3198 ha Most of the part of this cluster was comes under the degraded forest ecosystem. Land conditions were just near to barren. This block was selected for afforestation in 1993 under Aravali forest programme. But today Umarjhala cluster is a marvelous and healthy forest ecosystem which provides many important services upon which biodiversity depends. We have observed some environmental and socioeconomic benefits of this cluster during this case study. Environmental benefits are proved by major efforts of plantation. In this cluster 888 ha total area planted in this afforestation unit out of them 545 ha comes under Aravali Project, 295 ha comes under I.P.E.P. and 48 ha area planted in other schemes. Afforestation work was started here from 1994 on words. 545 hac land planted from 1994-1998. Some plantation work was also done under Janta Van Yojna. Plantation has been completed in different blocks under Aravali scheme project and JFM during 1994

to 1998 and from 1998 to 2002. The plantation is completed in cluster in linked patches. Socioeconomic benefits of this anthropogenic approach are proved by socioeconomic status of surrounding inhabitants which shows positivity of this forest ecosystem. This cluster is providing them their needful objects and economic benefits. 1301 families are benefited by NTFPs. Several local people also got employment under different schemes of afforestation of this area. This cluster is a part and parcel of social ecology also. Social ecology goes beyond environmentalism, insisting that the issue at hand for humanity is not simply protecting nature but rather creating an ecological society in the harmony with nature for future of present and future generations in sustainable manner. A structured systematic approach of conservation planning provides the foundation to main objectives of forest management strategy for sustainable development for managing whole landscapes including areas allocated to both production and protection. Forest cover is increasing in countries across the globe. New forests are regenerating and forest plantation is being established for different purposes. New plantation and secondary forests can improve forest ecosystem and help in wild life conservation. Anthropogenic approaches of restoration of forest ecosystem depend on some factors such as levels of forest, soil degradation and residual vegetation etc.

Umarjhala cluster on hills of Aravali of southern Rajasthan is an ideal model of tremendous ideology of afforestation. Afforestation is an archetype anthropogenic tactics of forest management, environmental protection and sustainable development. Biodiversity loss from deforestation can partly covered by the expansion of secondary forest, plantation forestry and other positive anthropogenic strategic activities. The limitation of protected areas has led to a growing interest in the conservation value of the wider anthropogenic landscape. Anthropogenic efforts to conserve nature and biodiversity have the potential to pay the economic services and their benefits to human beings. Some other aspects of wild life conservation are focused on water cycle, carbon sequestration and crop pollination etc are partially full filled by afforestation. Therefore these aspects are included in central themes of several environmental research projects and planning of afforestation. An integrating approach of sociologists, anthropologists, politicians and scientists is needed to identify how social structure and cultural elements can work together in this way. Extractive forest is also another important anthropogenic approach of conservation of forest ecosystem and biodiversity, because it is a good alternative of utilization of forest products without disturbing forest ecosystem. Extractive forest reserves are the most valuable land. These lands are useful for latex, resins, spices medicinal plants, ornamental plants and some other NTFPs. Deforestation is main cause of exhaustion of wild life diversity all over the globe. The main caveat to this age is annihilation of wild life this threat is considered as a threat to civilization for water war which is next to nuclear war. Sustainable conservation of tropical plant diversity entails conservation of the entire forest communities especially insects, birds, mammals and decomposers. These conservational efforts will be greatly enhanced and benefited by research on the dynamic of fruit and seed dispersal, pollination and community ecology. Physico-chemical properties of earth surface can change due to deforestation. Such changes are directly related with global warming. Afforestation may be a good strategy for this burning problem because afforestation project can act as a most effective carbon sink. Women always play key role in preservation and protection of tropical forest

ecosystem. In Zimbabwe so many groups of women manage forest ecosystem and socioeconomic activities through different projects and activities. Afforestation anthropogenic activity may be a social ecology goes beyond environmentalism, insisting that the issue at hand for humanity is not simply protecting nature but rather creating an ecological society in the harmony with nature. Umarjhala Pathara comes under Ghatol range of Banswara district of southern Rajasthan.

MEANS AND METHODS

The present study carried out in Umarjhala cluster of Ghatol Range of Banswara Forest Division. Forest land of this range is 20162.98 ha .This study is based on field, site observation and views of some viewers, villagers. The informations and data collected through discussions with members of Forest Department, Irrigation department of related area. Some data were also collected through secondary sources. These include literature review, reports and records of related department.

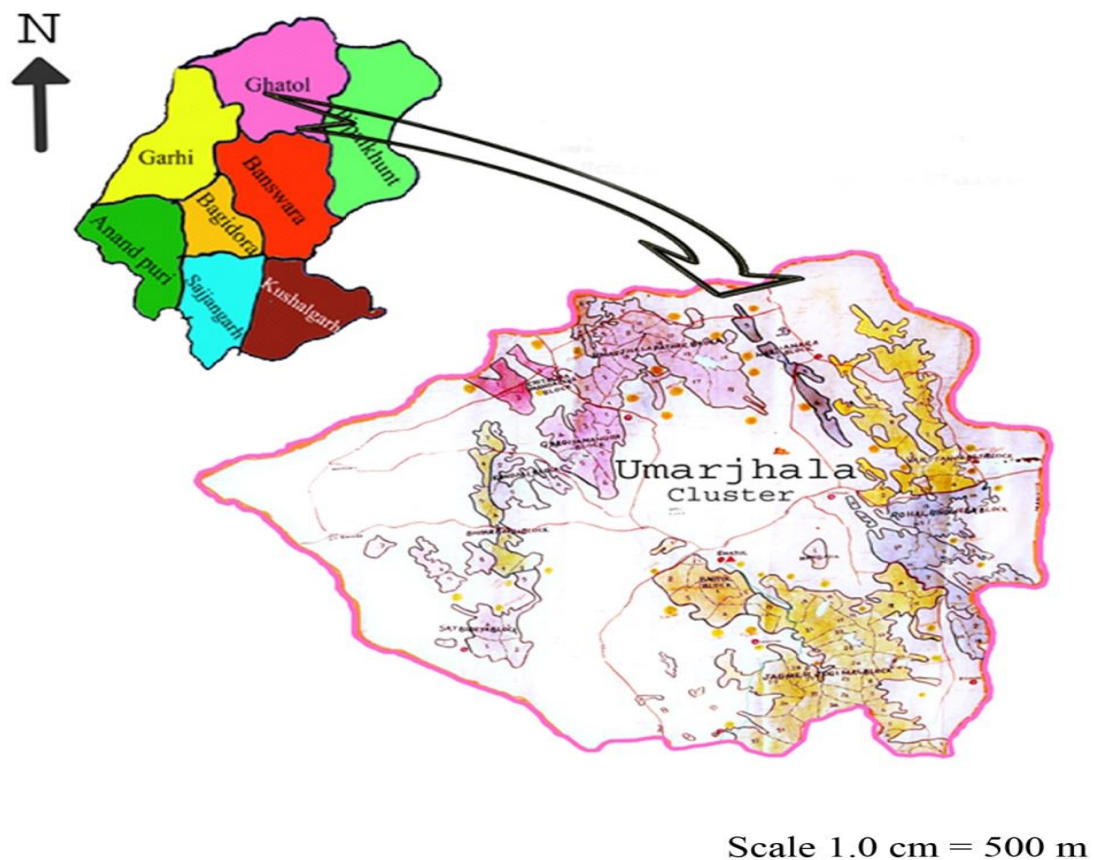


Fig. Map of study area

MAJOR FINDINGS

AFFORESTATION

The forest area has substantial role in the global carbon cycle. One of the traditional views in ecology is “nature knows best” and thus “let nature take its course,” which is essentially based on the time-honored notion of balance of nature. Tropical forests are home to two thirds of all plant species of the world, and play a vital role in maintaining global biodiversity and ecosystem functioning.

Afforestation done in like rocky, marshy, sandy soil and hilly and ravenous areas:

Work area fragile hilly, rocky, undulated terrain with frequent drought prone areas in this region. Keeping these conditions in mind specific treatment has been given by implementing in- situ soil and water conservation measures. Good survival was achieved in the area by adopting indigenous techniques. Deep planting technique, construction of inward slope water storing structure for plants ensures survival during longer dry spells. Operational research principles are adopted in soil and water conservation measures. Low cost and zero material based and loose stone masonry works are constructed in different areas. The majority of species are of multiple-use, lively hood based which are useful for fodder, fuel and minor timber. Planting were widely spaced (3X3 m.) to allow for natural invasion of some other plant species. Seeds from local trees like Baheda (*Terminalia belerica*), Khakara (*Butea monosperma*) Tendu (*Diospyros melanoxylon*), Neem (*Azadirachta indica*), Mahua (*Madhuca indica*) and Sadar (*Terminalia tomentosa*) etc. were collected to rise multiple use and hardy species which survive better in this difficult area. Plantation has been completed in different blocks under different schemes and projects during 1994 to 1998 and from 1998 to 2002 (Table 1) these blocks are linked together in a cluster area.

Mostly teak forest (938 ha) and natural forest (492 ha) are present in this afforested area (1768 ha). Some plantation work was also done under Janta Van Yojna and major part of plantation has been completed in different blocks under Aravali scheme project and JFM during 1994 to 1998 and from 1998 to 2002.

Table 1 Detail of Different plantation in Umarjhala cluster

| Sl. No. | VFPMc | Plantation name | Year | Area (Ha.) | Description |
|---------|----------------|----------------------------------|---------------|------------|-------------|
| 1 | Dagal | Umarjhala Pathara -I | 1994 | 50 | A.A.P. |
| | | Umarjhala Pathara-II | 1995 | 50 | A.A.P. |
| | | Umarjhala Pathara-C | 1999 | 50 | I.A.E.P. |
| | | Umarjhala Pathara-E | 2000 | 60 | I.A.E.P. |
| | | Umarjhala Pathara-(Dagal) | 2001 | 45 | I.A.E.P. |
| | | | Total | 255 | |
| 2 | Jhanjhor | Umarjhala Pathara - IV | 1996 | 50 | A.A.P. |
| | | Umarjhala Pathara -VIII | 1997 | 30 | A.A.P. |
| | | | Total | 80 | |
| 3 | Mahuwal | Umarjhala Pathara -III | 1995 | 50 | A.A.P. |
| | | Umarjhala Pathara -VI | 1996 | 65 | A.A.P. |
| | | Umarjhala Pathara -D | 1999 | 50 | I.A.E.P. |
| | | Umarjhala Pathara -F | 2000 | 40 | I.A.E.P. |
| | | | Total | 205 | |
| 4 | Pathara | Umarjhala Pathara -V | 1996 | 50 | A.A.P. |
| | | | Total | 50 | |
| 5 | Makanpura | Umarjhala Pathara -X | 1998 | 50 | A.A.P. |
| | | Umarjhala Pathara Z | 1998 | 50 | |
| | | | Total | 100 | |
| 6 | Amarpura | Umarjhala Pathara -IX | 1997 | 50 | A.A.P. |
| | | Umarjhala Pathara -XI | 1998 | 50 | A.A.P. |
| | | | Total | 100 | |
| 7 | Charna mundwai | Umarjhala Pathara -(Tartai) | 2000 | 50 | I.A.E.P. |
| | | | Total | 50 | |
| 8 | Vadalia | Umarjhala Pathara - (Vadalia) | 2002 | 48 | |
| | | | Total: | 888 | |

SOIL AND MOISTURE CONSERVATION

Soil and moisture conservation are very imperative for sustainable development of forest resources. Soil and water are the important natural resources and basic factors for meeting the essential requirement of food, fodder, fuel, fiber and timber etc. Land degradation poses a severe challenge to life of water bodies and agricultural productivity. These water bodies were threatened by siltation due to land degradation, deforestation and improper land uses in the catchments of working area. RCC check dam, earthen bund and loose stone masonry check dam, Ponds, Gabion bund, Percolation tanks, Contour trenches, Contour dykes, V-ditches and Anicuts were main treatment measures to achieve the goal. These structures were extensively constructed in and around forest areas. These structures resulted in increasing moisture availability to natural and artificial regeneration, enhanced productivity of otherwise seemingly unproductive areas, and helped in ground water recharge.

Influential Species of fuel wood and fodder plantations

Species are selected and prioritized as per the site condition and by villagers during micro planning. About 90% species are of multiple- use, value added, lively hood based species which yield fodder, fuel wood and minor timber. Species planted include Bamboo (*Dendrocalamus strictus*), Khair (*Acacia catechu*) Neem (*Azadirachta indica*), Churel (*Holoptelea integrifolia*), Aonla (*Emblica officinalis*), Ber (*Zizyphus spp*s), Sevan (*Gmellina aroboria*), Shisham (*Dalbergia sisso*), and Siras (*Albizzia spp*). Seed sowing is another important activity which was carried out in getting artificial regeneration in treated areas. In addition to sowing of tree species like Khair (*Acacia catechu*), Neem (*Azadirachta indica*), Ronjh (*Acacia leucophloea*) etc. fodder species like grasses mainly *Cenchrus ciliaris* and *Stylosanthes hamata*, and tree specie like Subabool (*Lucena leucocephala*) Ardu, (*Ailanthus excels*), Ber (*Zizyphus spe.*) and Khakara (*Butea monosperma*) are main species which are promoted in the area.

Faunal diversity

Faunal diversity of Umarjhala cluster (Table 2) shows that a forest ecosystem is improving in this afforestation area which will enhance wild life conservation goal and sustainable development with joint participation of villagers and forest department. Umarjhala cluster fulfill the characters of an extractive forest because it is an important site of utilization of forest product without disturbing the ecology of developing forest ecosystem.

Table 2 Faunal diversity of Umarjhala cluster

| S.N. | FAUNA | ZOOLOGICAL NAME |
|------|--------------|--|
| 1 | INVERTEBRATE | Common Protozoan, Coelenterates, Annelids, Snail, Insect, Arachnid etc. |
| 2 | AMPHIBIA | <i>Bufo melanostictus</i> , <i>Bufo stomaticus</i> , <i>Rana tigerina</i> , <i>Euphlyctis cyanophlyctis</i> |
| 3 | REPTILIA | <i>Python molurus</i> , <i>Eryx johnii</i> , <i>Calotes versicolor</i> , <i>Naja naja</i> , <i>Bungarus caeruleus</i> , <i>Hemidactylus triedrus</i> , <i>A. fasciolatus</i> , <i>Atretium schistosum</i> . |
| 4 | BIRDS | <i>Pavo cristatus</i> , <i>Halcyon smyrnensis</i> , <i>Copsychus saularis</i> , <i>Ardea cinerea</i> , <i>Ploceus philippinus</i> , <i>P. papillosa</i> , <i>C. nigra</i> , <i>A. grayii</i> , <i>B. ibis</i> , <i>C. albus</i> . |
| 5 | MAMMALS | <i>Presbytis entellus</i> , <i>Panthera pardus</i> , <i>Felis chaus</i> , <i>Herpestes edwardsi</i> , <i>Canis aureus</i> , <i>Hyaena hyaena</i> , <i>Lepus nigracollis</i> , <i>Boselaphus tragocamelus</i> , <i>Funambulus phillippensis</i> , <i>Vulpes bengalensis</i> |

CONCLUSION

This anthropogenesis approach is a good example of afforested clusters in this area in coming five years different VFMPs will get benefits from this cluster. Before the starting of Afforestation of this area microplaning and VFPMs were formed. That area was first plantation was completed within two and half days (24-26 June -2002).

FOREST BIODIVERSITY RESOURCE AND ITS CONSERVATION BY INDIGENOUS PEOPLE OF MIZORAM, NORTHEASTERN INDIA

F. Lalnunmawia
S.K. Tripathi

ABSTRACT

Bamboo represents a vast untapped major resource of Mizoram. At present, only a small percentage of bamboo resource, 28, 315 MT/Year are harvested for the purpose of local construction, tiny handloom and handicraft production. While the total bamboo yield works out to be 32,37,689 MT/Year in Mizoram, the annual aggregate consumption figures at 28, 315 MT/Year, resulting an annual Bamboo surplus of 32,09,374. Bamboo resources extracted at present may accounts for only 20 % of the total yield while 80% of the bamboo resource of Mizoram may remain unutilized, although the exact figure in not known. Thus, there is an urgent need to utilize surplus bamboos for generating employment and income (Anon. 2003a).

Keywords: Bamboo, resource, handloom, handicraft, consumption

INTRODUCTION

Mizoram literally the “land of highlanders” is among the seven sister states of northeast India spread over an area of 21,081 km². The state shares boundary with Myanmar in the southeast and Bangladesh in the west. Most of the area of the state is hilly having monsoon climate with an annual rainfall of 2440-3200 mm. The inhabitants of the state are known as the “Mizos”, a Mongoloid race migrated from Myanmar since the 7th century. The major ethnic groups in Mizoram are many tribes of Mizos such as *hmar*, *paihte*, *pawi / lai*, *mara* and other sub-tribes viz. *bru (tuikuk)* and *chakma* who came to Mizoram lately. The tribes of Mizoram have their sets of culture and traditional customs. Tracing back the history of these tribes, it is certainly been known that tribes of Mizoram remained quite undisturbed till the British period of 1826. It reached its culmination of the bestowal of statehood to Mizoram in the year 1987.

Population of the state is 10.91 Lakhs as per 2011 census with an increase of 2.02 lakhs from 2001 census. In 2001, human population density of the state is 52 per sq km which far less than national average 382 per sq km. Of the total population, male and female accounts for 552,339 and 538,675 lakhs, respectively. About half of the total population lives in over 700 villages. Majority of the population in the state are literate and are ardent believers of Christianity. The total population of Mizos is ~0.7-0.8 million with majority live in villages that used to be governed by village chiefs (or “*lal*”) in the past, which has now been replaced by elected village councils. They are living in a close-knit society with code of ethics, or locally “*tlawmngaihna*”, espouses a moral of self-sacrifice for the common good. Mizo tribe has the code of ethics that goes around ‘*Tlawmngaihna*’ an untranslatable term which intends that each and every

people, belonging to these tribes, needs to be cordial, kindhearted and generous. The tribes of Mizoram should also help all helpless and poverty stricken people. Agriculture is the main occupation and shifting cultivation continues to be the predominant practice, affecting as much as 6,000 km² or about 28 percent of the state land. The Forest Survey of India estimated that ~0.38 million ha (~18% of the state area, Anon, 2000a) area was affected by shifting cultivation between 1987 and 1997.

The state has mountainous topography with steep slopes forming deep gorges culminating into several streams and rivers. Almost all the hill ranges traverse in the North-South direction. The eastern part of Mizoram is at a higher elevation compared to the western part. Though very small in the total geographical area the land is endowed with a number of physiographic units namely; ridges, very steep side slopes, straight slopes, flat lands, terrace and narrow valleys. Due to complexity of physiographic units, various micro-climates prevail from the high elevation to low elevation. About 21 major hill ranges or peaks of various heights run through the length and breadth of the state. The important Hills and Mountain ranges of Mizoram with their altitudes are given in Table 1. Unlike the major ranges running East to West in other parts of the country, the mountain ranges of Mizoram are small and moderate altitude and run north to south (Anon, 2006).

Table 1. Important mountains of Mizoram with their altitudes

| Serial No. | Mountain ranges | Altitude (m) |
|------------|---------------------------|--------------|
| 1. | Phawngpui (Blue Mountain) | 2157 |
| 2. | Lengteng | 2141 |
| 3. | Surtlang | 1967 |
| 4. | Lurhtlang | 1935 |
| 5. | Tantlang | 1929 |
| 6. | Vapartlang | 1897 |
| 7. | Chalfilhtlang | 1866 |
| 8. | Hrangturzotlang | 1854 |
| 9. | Zopuitlang | 1850 |
| 10. | Hmuifangtlang | 1619 |
| 11. | Saireptlang | 1555 |
| 12. | Sakawrhmuaitlang | 1535 |
| 13. | Reiektlang | 1485 |
| 14. | Thorangtlang | 1387 |

There are 15 major rivers in Mizoram, out of which seven rivers, namely Tuivawl, Tuvai, Tuirini, Tlawng, Tut and Teirei flow northward and ultimately confluence with Barak river of Assam valley. Other five rivers namely, Mat, Tuichang, Khawchhaktuipui, Tiau and Chhimtuipui (Kolodyne) flow towards south. The remaining three rivers namely Tuichawng, De and Khawthlangtuipui flow to the west. In the south of Mizoram, the Karnaphuli flows in the northward direction and then enters Bangladesh. The river Kolodyne of Southern Mizoram flows southern and enters Myanmar. River Kolodyne and River Karnaphuli are large rivers and are navigable to a

great extent, leading respectively to the ports of Akyab in Myanmar and Chittagong in Bangladesh. The River Tlawng (Dhaleshwari) is the most important river in the northern part of Mizoram flows north to join the Barak river in Assam's Cachar district. The Chhimtuipui (Kolodyne) which originates in Myanmar is an important river in South Mizoram.

Table 2. Important rivers of Mizoram

| Serial No. | Name of rivers | Length (km) |
|------------|-------------------------------|-------------|
| 1. | Tlawng (Dhaleshwari) | 185.15 |
| 2. | Tiau | 159.39 |
| 3. | Chhimtuipui (Kolodyne) | 138.46 |
| 4. | Khawthlangtuipui (Karnaphuli) | 128.08 |
| 5. | Tuichang | 120.75 |
| 6. | Tuirial | 117.53 |
| 7. | Tuichawng | 107.87 |
| 8. | Mat | 90.16 |
| 9. | Tuipui | 86.94 |
| 10. | Tuivawl | 72.45 |
| 11. | Teirei | 70.84 |
| 12. | Turini | 59.57 |
| 13. | Serlui | 56.35 |

The soil of Mizoram is dominated by sedimentary formation. These are generally young, immature, mostly developed from parent materials such as fereginous sandstones and shale. The soils in the foot hills are calcium deposit and in plain areas alluvial deposits. Three soil orders such as ultisols, inceptisols and entisols are found in Mizoram. The soils as a whole are well drained except in few valley flat lands. The soil in the hills is strongly acidic in reaction, whereas the soils in alluvial deposits are less acidic. The surface soils of the hilly terrains are dark, highly leached and poor in bases, rich in iron and have pH values ranging from 4.5 to 5.5 (strongly acidic). The surface soil textures are loam to clay loam with clay content increasing with depth. The percentages of clay, silt and sand within 50cm of the surface in most cases are 20-30% and 25-45% respectively (Anon., 2010).

The area is rich in forest wealth that is inhabited by myriads of species due to favorable climatic conditions of the region. In this paper we describe the variations in the landscape and forests of the region and illustrated the strategies for the conservation of forest wealth of the state by the indigenous people.

Forest types of Mizoram

Forest constitutes dominant features of the State's landscape covering 91% of the total geographical area (Anon. 2003b, FSI 2009), economy and environment. Due to the age-old practice of shifting cultivation, uncontrolled fire, unregulated felling and land allotment to individuals, two-thirds of the area has already been in various stages

of degraded. Of the total State's economy, contribution of forestry sector in terms of economic value of goods and services is estimated to be about Rs 100 crore per year (Anon. 2003b).

The state falls under the tropical semi-evergreen belt. However, due to reduced jhum cycles it is replaced by bamboo interspersed with secondary forests. Based on the forest classification by Champion and et al's (1968), the following three forest types are found in the state:

- i) Tropical wet-evergreen forests (up to 900 m).
- ii) Tropical semi-evergreen forests (900–1500m), and
- iii) Montane sub-tropical pine forests (1500–2158 m).

Of the above three types, Tropical Wet Evergreen Forest type is the most important which distributed in the Southern and Western parts of Mizoram. These forests are rich in valuable evergreen timber species and non-timber produce. The common timber species are: *Dipterocarpus turbinatus*, *Artocarpus chaplasi*, *Terminalia myriocarpa*, *Terminalia chebula*, *Duabanga sonneratioides*, *Amoora wallichii*, *Michelia champaca*, *Callophyllum inophyllum*, *Mesua ferrea*, *Podocarpus neriifolia*, etc. in the top canopy; mixture of *Dendrocalamus strictus*, *Dendrocalamus hamiltonii*, *Melocanna baccifera*, *Bambusa tulda*, *Bambusa pallidas*, and *Cinnamomum* species in the middle storey and Cane, *Laportea* etc in the undergrowth (Anon. 1990, 2003a and 2003b).

Tropical semi-evergreen forest covers the central bio-geographic zone with approximately 50% of the total geographical area. The common tree species found in these forests are: *Michelia champaca*, *Schima wallichii*, *Gmelina arborea*, *Toona ciliata*, *Chukrassia tabularis*, *Sterculia villosa*, *Sterculia colarata*, *Podocarpus neriifolia*, *Adina cordifolia*, *Bombax ceiba*, *Phoebe attenuata*, *Syzygium cumini*, *Albizia species*, *Castanopsis tribuloides* etc. Bamboo species like *Melocanna baccifera* and *Dendrocalamus* species and Canes are in abundance, especially in shady and low lying areas (Anon. 2003a).

Deciduous trees frequently cover the drier areas of the above two forest types. The common tree species are: *Juglans regia*, *Emblia officinalis*, *Macaranga peltata*, *Sapium baccatum*, *Bischofia javanica*, *Anthocephalus cadamba*, *Albizia lebbek*, *Gmelina arborea*, etc.

Montane sub-tropical pine forests (between 1500 and 2158 amsl) occur in the eastern fringes bordering Myanmar, which constitutes ~24% of the total geographical area. It has a sub-temperate climate and the temperature varies from 9°C to 25°C. The common tree species are *Rhododendron arboreum*, *Myrica esculenta*, *Engelhardtia spicata*, *Quercus serrata*, *Quercus griffithii*, *Pinus kesiya*, *Lithocarpus dealbata*, *Rhus accuminata*, etc. Bamboo species like *Arundinaria callosa*, *Sinarundinaria intermedia*, *Dendrocalamus sikkimensis*, *Melocalamus compactiflorus* are found in abundance. This forest is the natural abode of epiphytic orchids like *Renanthera imschootiana*, *Vanda coerulea*, *Dendrobium species* (Anon. 2003a and 2003b).

Mizoram is rich in wild flora and fauna and ~88,400 ha of the forest area of the State are protected by two National Parks and four wildlife sanctuaries. The total forest produce of Dampa Tiger Reserve during 2002-2003 was valued at 304.83 lakhs. Before 1980, an estimated 7,900 hectares of plantations was done in the State. The average annual plantation peaked to 20,500 hectares during 1985-90. The rate declined to 6,800 ha during 1998-99. In the absence of alternative livelihood activities most of the people depend primarily on the exploitation of these resources. As a result there is increasing pressure on forest land with aggravating land degradation problem without mechanism for resources regeneration. Such is the case in the region which is considered as one of the two areas of bio-diversity “hotspot” in Indian sub-continent. Given this context various interventions has been directed at resolving both problems of poverty and natural resource degradation in this region. The extent of forest cover in Mizoram according to State of Forest Report (FSI, 2005, 2007 and 2011) are as shown in the table below.

Table 3. Forest covers change in Mizoram in last decade.

| Year | Very Dense Forest | Moderately Dense Forest | Open Forest | % Forest cover |
|------|-------------------|-------------------------|--------------------|----------------|
| 2003 | 84 (0.40%) | 7404 (35.12%) | 10942 (51.90%) | 87.4 1% |
| 2005 | 133 (0.63%) | 6173 (30.28%) | 12378 (57.31%) | 88.22 % |
| 2007 | 134 (0.63%) | 6251 (29.65%) | 12855 (60.97%) | 91.27 % |
| 2011 | 134 (0.63%) | 6086 (28.87%) | 12,813 (61.18%) | 90.68 % |

(Source: State of Forest Report, 2005, 2007 and 2011)

Land Tenure System in Mizoram

The land tenure system in Mizoram is markedly different from the system found in the plain areas of the country. Two systems of land tenure are being practiced in the state:

- a) **Community ownership of land** — areas where shifting cultivation is in practice households enjoy user rights to land allocated to them by traditional authority. Major portion of the land within Mizoram falls under the customary ownership of the communities. Village land falling within the jurisdiction of a village is traditionally controlled by the Village Council and land allotment is done as per the customary practice to the villager for jhuming and other farming activities. This type of land tenure is problematic for advancing bank credit and creates incentives for investment on land improvement and conservation in long run. Shortening of *jhum* cycles due to increasing population and decreased availability of land for shifting cultivation has become a major issue for economic and environmental sustainability the region. Therefore, customary community ownership is now undergoing certain modification to meet the needs in the face of changing land use opportunities. Terrace and valley land is considered as private land with permanent

heritable and transferable rights through the issue of land settlement certificate (LSC) by the competent authority.

- b) **Individual ownership** — other areas individual holdings of land is in practice with a restriction that transfer of the holding is possible within the tribal population. Details of the modalities of such transfer differs from state to state. But the broad pattern is as follows: Transfer by sale of individual holdings within a village can take place within members of the same tribe, and such transfers are recognized by the village community. In some cases, sale deeds on plain or stamped papers are executed by the transacting parties to record the transfer. But the process does not result in any formal record or documents conferring land holding rights. Inter-tribal transfer of individual holdings of village land is generally not in practice, though such transfer of communally held land are know to be in practice. In towns, transfer of land holdings among individuals of even different tribes but of the same state is generally permissible. But transfer of land holding rights to non-tribal is prohibited by law in all the hill areas to prevent alienation of tribal land.

Impacts of land allotment to individuals

In Mizoram, after getting the individual ownership village farmers slowly became landless by selling them to the rich people mainly from urban areas. For instance, plots of land were allotted to each household for permanent land-use under Garden Colony failed to improve the livelihood of the rural poor and thus, many landowners sold their lands in order to make both ends meet. This has led to concentration of land in the hands of a few individuals or families within the tribe and ultimately disparity within the community but with slowly.

Land transfer also takes place in case of indebtedness to meet emergencies such as medical and educational needs. In many cases, alcoholism or addiction is also responsible for sale or mortgage of property. Gradually land, particularly the fertile plots, gets concentrated in a few families. When community ownership was the order, such disparity was unknown. There was land for everyone and none lived in poverty. Individual ownership brought about the conditions favourable to land concentration in the hands of richer people. This practice is more common in the areas closed to the cities of Mizoram. Many people make their living either by cultivating the land belonging to others as labourers.

Diversity of forest resources in Mizoram

Timber resources

The common and important timber yielding species in the community forests are: *Dipterocarpus turbinatus*, *Artocarpus chaplasha*, *Terminalia myriocarpa*, *Amoora wallichii*, *Michelia champaca*, *Mesua ferrea* etc. The common species in the tropical semi-evergreen forests are *Schima wallichii*, *Gmelina arborea*, *Cedrela toona*, etc. The common species of sub-tropical pine forests includes *Pinus keseya*, *Quercus spp.*, *Castanopsis spp.*, *Schima wallichii*, *Rhododendron arboreum*, *Rhus semialata*, etc. The timber resources of Mizoram are under tremendous pressure due to increasing demand for building and furnitures. Teak Forests (*Tectona grandis*) have been artificially

planted in many parts of the state because of high demand for construction and furniture making due to the quality timber. The other timber yielding species commonly used for house construction and furniture are *Michelia champaca*, *Terminalia spp*, *Gmelina arborea*, *Dipterocarpus turbinatus*, *Artocarpus chaplasi*, *Terminalia myriocarpa*, *Terminalia chebula* etc. Massive extraction of timber for local industries and export markets is responsible for the loss of biodiversity and disruption of forest ecosystem in Mizoram.

Non-timber forest products (NTFP)

In addition to timber production, Mizoram is rich in non-timber forests product (NTFPs) species which are distributed in different types of forests. The important NTFPs are bamboo, canes, medicinal plants, orchids, wild edible plants and fruits which are described below.

Diversity of bamboos, canes and rattans

Mizoram is rich in bamboo resources covering an area of 6,118 Km² accounting for 29% of total geographical area (Anon., 2009). *Melocanna baccifera* Kurz. is the most common contributing about 90% of the bamboo growing stock of the state. Lalramnghinglova and Jha (1997) reported 22 species of bamboo in Mizoram. Environment and Forest Department in a recent survey reported 35 species of bamboo (indigenous and exotic species) in the state (Anon., 2010). Bamboo occurs in the lower story of Tropical Evergreen and Moist Deciduous Forests along the banks or rivers in the riverside forests and in the valleys with humid conditions. Bamboo is found from 40 metres to 1500 metres elevation but is rare in the eastern region of the state, particularly in Champhai due to high altitude.

Bamboos generally form under-storey in the natural forests. The natural bamboo forests is found in the north and the north-west of Mizoram, and a large area of bamboo/tree mixed forests belongs to the state/communities and individual landowners has also been found. Bamboo can be divided into two main categories according to growth pattern, (1) sympodial or clump forming, and (2) monopodial or non-clump forming, runner bamboo. Monopodial bamboo accounts for 90% of the total growing stock and clump forming bamboo accounts for 10% of the growing stocks.

The bamboo species found in Mizoram are: *Bambusa tulda* (Roxb), *Bambusa vulgaris* (Schrader ex Wendl.), *Bambusa khasiana*, Syn. *Schizostachyum mannii* (Gamble) Majumdar, *Chimonobambusa callosa* (Munro) Nakai, *Dendrocalamus hamiltonii* Nees and Arn., *Dendrocalamus longispathus* (Kurz), *Dendrocalamus sikkimensis* (Gamble), *Dendrocalamus hookeri* (Munro), *Dendrocalamus strictus* (Roxb) Nees., *Melocanna baccifera* (Roxb) Kurz., *Melocalamus compactiflorus* (Kurz), *Neomicrocalamus mannii* (Gamble) Naithani, Syn. *Arundinaria mannii*, *Phyllostachis manii*, *Schizostachyum fuschianum*, Syn. *Cephalostachyum fuschianum* (Gamble), *Schizostachyum dulloo* (Gamble), *Schizostachyum polymorphum* (Munro) Majumdar, Syn. *Pseudostachyum polymorphum* Munro, *Sinarundinaria griffithiana* (Munro), *Sinarundinaria longispiculata*, *Sinarundinaria falcate* (Nees) , *Bambusa nutans*, Syn. *Sinarundinaria khasiana*, *Bambusa nagalandiana* (Naithani),

Thyrsostachys oliveri (Gamble). Naithani *et al.* (2010) recently described two species of bamboo from Mizoram which are *Bambusa mizorameana* (Naithani), *Bambusa dampaeana* (Naithani).

Bamboo is used mainly used for construction, furniture, farm implements etc. In recent years, Bamboo Culm is becoming popular in Mizoram as the raw material for the manufacture of incandescent sticks and chopsticks. The Mizoram Bamboo Development Agency has been working to manufacture various bamboo products like pebble mat, square sticks, handicrafts and daily use items, slivers, mat-blind etc. Further, a handsome quantity of bamboo culms was sent as raw materials for house construction in Tsunami affected region of the Andaman and Nicobar Islands. Bamboo has been closely connected with the daily living of people in Mizoram. It is being used as firewood, tiles, paper, rafts, hats, etc. Bamboo shoots are considered as a popular food and the local markets are flooded with bamboo shoots during July to September each year. Even today, bamboo is an important raw material for house construction, especially among the tribal people in remote villages.

Four genera of canes namely, *Calamus*, *Daemonorops*, *Zalacca* and *Plectocomia* are found in Mizoram. Lalnuntluanga (2007) reported a total of 12 species of rattans belonging to these four genera. Nine species of *Calamus* are located in the state which are: *C. acanthospathus* (Thilte), *C. erectus* (Thilthek), *C. flagellum* (Hruipui), *C. gracilis* (Kawrtai), *C. guruba* (Taite/Tairua), *C. inermis* (Mitperh), *C. khasianus* (Mawt), *C. nambariensis* (Mawtpui), and *C. tenuis* (Changdam). One species each of *Daemonorops*, i.e. *D. jenkinsianus* (Raichhawk), *Zalacca* i.e. *Z. secunda* (Hruitung) and *Plectocomia* i.e. *P. assamica* (Mawttak) is found.

Rattans/canes also play an important role in the socio-economic life of the people of Mizoram. Rattans are largely used in cottage industries and many people earned their livelihood from the industry. Rattans are used in different ways for vegetables, medicines, furniture, religious purposes and others (Lalramnghinglova, 1995; Pradhan, 1998; Sawmliana, 2003). They used for making furniture - chairs, beds, table, magazine racks, flower pot holder, hanger, filter stand, handles, arms etc. Split canes are also used for making baskets, fruits edible, young shoots as vegetables, leaves for thatch, for tying in bridges constructions etc. Rattans are harvested from the forest by the rural people as well as permit holders and sell them to the market for further uses. Excessive harvesting of cane resources from the forest for furniture, vegetables and others causes the fast depletion of the species. The unscientific collections and harvesting of un-matured raw rattans from the forest resulted in the fast depletion of the rattan resources. Shifting Cultivation is also one of the important factors for the declined in the rattan population in the state.

Diversity of orchids of Mizoram

Mizoram has a luxuriant growth of orchids with a high degree of diversity owing to its favourable environment. There are about 250 orchid species already reported, however, the diversity of orchid may be much more (Saithantluangi, 2010). Many studies have been conducted on orchids of Mizoram (Deori and Malhotra, 1973; Deori and Das, 1979; Seidenfaden, 1982; Singh *et al.*, 1990; Chawngthantluanga, 1995). Commercial cultivation of orchids is not yet taken up in Mizoram while in other

part of North-eastern India, orchids are being recognized as a good source of income. Orchids are found abundantly on forest floors.

Some of the epiphytic and terrestrial orchid's species are being cultivated cultured in the orchids house and on the tree trunks for their conservation and further studies. These includes: *Acamp spp* , *Aerides odorata* , *Ceologyne viscosa*, *Cybidium spp*, *Dendrobium spp*, *Thunia alba*, *Papilionanthe fimbriata*, *Renanthera imschootiana*, *Vandal ceorulea*. Among these both *Aerides* and *Cymbidium spp* are the most common ones. Due to shifting cultivation, and over-exploitation and collection from their natural habitat, the orchid population is declining very rapidly (Singh *et al.*, 1990) As a result, about 50% of the orchids of Mizoram, today, fall under different categories of threat as envisaged in the 'Red Data Book' published by the International Union for Conservation of Nature and Natural Resources (Singh *et al.*, 1990). A proper conservation (both *in situ* and *ex situ*) of these plants is an urgent need for fetching good revenue and generates employment.

Many species of orchids have great potential for pharmaceutical industries like the species of *Dendrobium denudans*, *D.devonianum* Paxt., *D.eriiflorum* Griff., *D.pychnostachyum* Lindl., *Paphiopedillum spicerianum* (Rchb.f.) Pfitz., *P.villosum* (Lindl.) Pfitz., *Renanthera imschootiana* Rolfe., *Vanda coerulescens* Griff. had been illegally collected from Mizoram by people from Myanmar for international trade. There has been a report of collection and transport of wild orchids like *D. transparens*, *D.aphyllum* known as 'halikaphul', to Prasighat in Arunachal Pradesh, Gwahauti, Shillong, Calcutta, Mizoram, Manipur; Myanmar, China, Thailand, Malaysia, Singapore, Hongkong and European countries like Italy and France. Besides their ornamental value, these orchids have their medicinal values to treat malaria, tuberculosis, snake bites, rabies, nervous disorder, heal wounds and as anti-AIDS agent.

Thus, orchid farming can generate additional income for local people and improve the socio – economic condition of the poorer sections of the society. Therefore, if species and hybrids are made available at nominal prices to the local people, through breeding, improving and by scientific multiplication, the habitat and environment in which the orchids have established their home for so many year can be conserved. This will not only help the germplasm to multiply but also would permit evolution to proceed on its natural course (Kumar and Sharma, 1995).

Now young generation are gradually becoming environmentally conscious and trying to create awareness to conserve rich diversity of orchids. *Ex-situ* conservation in different forms may be initiated. A need is felt to encourage orchid farming in areas close to the forests to supplement the income of villagers. Orchids are wealth and heritage of the state and thus needs conservation and use on sustainable basis for prosperity. The steps taken by the State Forest Department habitats by establishing orchid sanctuaries in Ngopa and Sairep Forest Reserves is a positive sign of orchid conservation in Mizoram.

Diversity of Medicinal Plants of Mizoram

More than 400 medicinal plants have been reported from Mizoram in which 62 were recorded as new medicinal plants and 64 species were categorized as threatened species. Limited works have been done on the traditional and indigenous knowledge systems in Mizoram. Lalnundanga and Jha (2000) have stated that ethno-botanical work helps in the search of plants which are used by local people as folk medicine. Some of the most notable contributions, based upon actual ethno-botanical survey, are made by Lalramnghinglova (1996); Lalramnghinglova and Jha (1997). Lorrain had mentioned some traditional medicines used by the Lushai people in Mizoram. Vailinga (1991) has also documented 165 diseases and their ethno medicine while Rozika (2001) documented 204 plants along with their uses.

The Mountain Sub-tropical Hill Forests in the eastern part of Mizoram are yet to be fully covered ethno-botanically. In-depth study and complete inventorization of medicinal plants available in rich bio-diversity area is one of the 'Green' prospects of research field in Mizoram. The natural forests and protected areas are the best custodians of medicinal plants.

Recently the Govt. of India has identified medicinal plants as one of the major thrust areas for research development as an important bio-resources. The Department of Health and Family Welfare, Govt. of Mizoram through State Medicinal Plants Board (SMPB) has been taking up various projects on cultivation and conservation of medicinal plants with the support of National Medicinal Plants Board. Projects have also been proposed to establish medicinal plants conservation areas in degraded and marginal sites not only to meet the traditional health care need for the people but also to raise income from the sale medicinal herbs, shrubs, climber of commercial demand, beside being conserving the sites for ecological benefits.

The distribution of medicinal plants is quite diverse in the state of Mizoram. Nearly 400 species of medicinal plants have been reported which have some ethno botanical uses, of which more than 50 species could be categorized as threatened species. Some important medicinal plants which are currently undergoing propagation include: *Cinamornum zeylanicum* (Thakthing), *Smilax glabra* (Tluangril), *Aloe vera solamnum* (Anhling), *Piper longum* (Thinghmarcha), *Garcinia cambogia* (Chengkek chi) etc. However, the ongoing slash and burn agriculture can be the single largest threat to the natural growing plant populations including the medicinal plants.

Commonly used medicinal plants of Mizoram

Some important medicinal plants of Mizoram are : *Alstonia scholaris* (Thuamriat), *Dillenia pentagyna* (Kaihzawl), *Helicia robusta* (Pasaltakaza), *Lepionurus sylvestris* (Anpangthuam), *Mallotus roxburghianus* (Zawngtenawhlung), *Taraktegenos kurzii* (Khawitür), *Zanthoxylum armatum* (Arhrikreh), *Catharanthus roseus* (Kumtluang), *Hedyotes scandens* (Kelhnamtur), *Justica adhatoda* (Kawldai), *Mimosa pudica* (Hlonuar), *Piper diffusum* (Pawhrual), *Securinega virosus* (Saisiak), *Achyranthes bidentata* (Vangvattur), *Aeginetia indica* (Sangharvaibel), *Ageratum conyzoides* (Vaihlehlo), *Begonia inflae* (Sekhupthur), *Bergenia ciliate* (Kham

damdawi), *Centella asiatica* (Lambak/Hnabhlal), *Chromolaena odorata* (Tlangsam), *Costus speciosus* (Sumbul), *Curculigo capitulate* (Phaiphek), *Curcuma longa* (Aieng), *Homalomena aromatic* (Anchiri), *Lindernia ruelloides* (Thasuih), *Mikania micrantha* (Japanhlo), *Pratia nummularis* (Choakthi), *Scoporia dulcis* (Perhpawngchaw/Hlothlum), *Entada pursaetha* (Kawi), *Pseudodrynaria coronans* (Awmvel), *Cinnamomum verum* (Thakthing).

It is reported that some of the medicinal plant species in Mizoram are found vulnerable or on the verge of extinction; the villagers and rural people do not have any well defined conservation strategy of the kind we understand in modern terms; but, they do conserve plants that are medicinally, economically and socially significant. Creating community-based protected area networks may also be very useful for strong indigenous traditions of nature conservation and protection. Government, NGO's, Forest Department and research institution must take steps with the participation of local people for the conservation and multiplication of plant species (Lalrinkima and Lalnundanga, 2011).

Diversity of wild fruits and edible plants

The wild edible fruits and vegetables are important component of community forests. These forest products are available in the markets throughout the year and play an important role in the rural livelihood. Based on their preliminary survey, Lalremruata and Lalramnghinglova (2011) listed the commonly used NTFPs in Mizoram as under:

Wild fruits: *Anodendron paniculatum* (Theikelki), *Artocarpus lakoocha* (Theitat), *Averrhoa carambola* (Theiherawt), *Baccaurea ramiflora* (Pangkai), *Bruinsmia polysperma* (Theipalingkawh), *Carallia branchiata* (Theiria), *Chrysophyllum cainito* (Theipabuan), *Cyathocalyx martabanicus* (Hreirawt), *Dillenia indica* (Kawrthindeng), *Embllica officinalis* (Sunhlu), *Eugenia jambolana* (Lenhmui), *Euphoria longan* (Theifeimung), *Ficus rostrata* (Theitit), *Ficus semicordata* (Theipui), *Garcinia sopsopia* (Vawmva), *Garuga pinnata* (Bungbutuairam), *Glochidion arborescens* (Tuaitit), *Kadsura heteroclita* (Theiarbawm), *Meliosma pinnata* (Tuairam), *Morus australis* (Lungli), *Memecylon ceeruleum* (Theikawrak), *Protium serratum* (Bil), *Rhus semialata* (Khawmhma), *Spondias pinnata* (Taitaw), *Stixis suaveolens* (Theisawntlung), *Terminalia chebula* (Reraw), *Xeromphis spinosa* (Sazutheipui), *Ziziphus mauritiana* (Bawrai).

Wild vegetables: *Agaricus campestris* (Mau-pa), *Amomum dealbatum* (Aidu), *Amorphophallus paenifolius* (Telhawng), *Antidesma diandrum* (Thurte-an), *Aralia foliosa* (Chimchawk), *Bambusa tulda* (Rawthing), *Calamus flagellum* (Hrui-pui), *Calamus acanthospathus* (Thilte), *Dendrocalamus longispathus* (Rawnal), *Dendrocalamus hamiltonii* (Phulrua), *Diplazium maximum* (Chakaw), *Derris wallichii* (Hulhu), *Dysoxylum gobara* (Thingthupui), *Entoloma microcarpum* (Pasawntlung), *Eurya cerasifolia* (Sihneh), *Lepionurus sylvestris* (Anpangthuam), *Melocanna baccifera* (Mautak), *Musa acuminata* (Tumbu), *Oroxylum indicum* (Archangkawm), *Parkia timoriana* (Zawngtah), *Polygonum plebium* (Bakhate), *Schizophyllum commune* (Pasi), *Solanum nigrum* (Anhling), *Zalacca secunda* (Hruitung).

Fodder species: *Amorphophallus paeniifolius* (Telhawng), *Artocarpus heterophyllus* (Lamkhuang), *Artocarpus lakoocha* (Theitat), *Bidens pilosa* (Vawkpuithal), *Colocasia esculenta* (Dawl), *Ficus rostrata* (Theitit), *Imperata cylindrical* (Di), *Ipomea batatas* (Kawlbahra), *Macaranga indica* (Hnahkhar), *Manihota esculenta* (Pangbal), *Mikania cordata* (Japanhlo), *Musa acuminata* (Changel), *Saccharum spontaneum* (Luang), *Spilanthus acmella* (Ankasa), *Thysanolaena maxima* (Hmunphiah).

Ornamental species: *Bauhinia variegata* (Vaube), *Bombax ceiba* (Phunchawng), *Erythrina stricta* (Fartuah), *Langerstromia speciosa* (Thlado/Chawnpui), *Prunus cerasoides* (Tlaizawng), *Renanthera imschootiana* (Senhri), *Rhododendron waghtii* (Chhawkhelei par var), *Rhododendron arboretum* (Chhawkhelei par sen), *Saraca asoca* (Mualhawih), *Vanda coerulea* (Lawhlei).

Broomgrass and fibre plants: Broom grass (*Thysanolaena maxima*) is of great importance in the mountainous region as it provides good quality fodder, fuel, broomsticks and also acts as a soil stabilizer. Recently state government had supported its extension through New Land Use Programme (NLUP) and the local people are willing to plant this grass as cash crop for broomstick. This grass grow in the sub-tropical Himalayas from plains to 2000 m altitude and are extensively planted in the hills specially in wasteland and also as inter-cropping in agroforestry systems or on the edges of terraces. Some villagers cultivated broomgrass since last couple of years in small areas with government incentives. It is an important forest produce of Mizoram grows in the wild in almost all parts of the state. Broomgrass finds a number of applications besides using the inflorescence of the plant for cleaning purposes, the leaves of the plants are used as fodder and the sticks as a raw material in the paper industries and small scale cottage industries for making mats. It is important for ecological point of view also as it protects the soil from erosion.

Faunal Diversity of Mizoram

Many of the community conserved forests harboured diverse species of birds and animals. The wild animals like Sambar (Sazuk), Barking deer (Sakhi), Squirrels, Wild Cats, leopards, Wild dogs, different species of reptiles and amphibians etc. are found in many of the community conserved forests. In the past decades, the community conserved forests in many parts of Mizoram have provided habitation to a diverse group of birds viz. *Pycnonotus cafer* (Tlaiberh), *Treron apicauda* (Vahui) and *Megalaima franklini* (Tuklo), *Ducrurus renufer* (Vakul), Hume's Bantailed Pheasant (Va-vu), Jungle Fowl (Ramar), Kaleej Pheasant (Vahrit) etc. However, an ever increasing pressure on these forests has caused destruction and shrinkage of natural habitats and scarcity of wild foods which have resulted into the rapid decline in the population of birds and animals in these areas.

A preliminary information collected by the author showed that there is a remarkable decrease in the population of these birds from the village community forests, probably due to cutting and felling of wild fruit trees like *Ficus sps* (Hmawng), (*Macropanax oreophilum* (Phuanberh), *Acrocarpus fraxinifolius* (Nganbawm), *Bischofia javanica* (Khuangthli), *Sapium baccatum* (Thingvawkpui), *Cordia sps* (Muk) etc. Similarly, Great Pied Hornbill (Vapual), Wreathed Hornbill (Kawlhawk) disappeared

while the population of Jungle Fowl (Ramar), Kaleej Pheasant (Vahrit) etc. has greatly declined from the forests of Mizoram. This may be attributed to habitat destruction and fragmentation due felling and removal of some wild fruit-bearing tree species like *Michelia champaca* (Ngiau) and *Phoebe hainesiana* (Bul) (Lalnunmawia 2005).

Similarly, different species of reptiles such as Snakes and Lizards as well as amphibians like Frogs and Toads found in Mizoram are also decreasing gradually as a result of disturbances of habitats. Destruction and disturbances of their habitats has checked the reproduction, growth and multiplication of animal and birds. There has been a severe reduction in both the range and the population due to habitat lost as a result of extraction of trees for fuelwood and timber, human settlements, practice of shifting cultivation and forest fire.

The present generations in Mizoram have, however, realized the need to preserve and or restore the original habitat of many wild fauna. In many parts of the state, YMA and other NGOs have come forward and play leading roles in the establishment, protection and conservation of reserve forests and sanctuaries. In this regard, there is some requirement of significant planning input keeping in view of the specific biological requirements of each species. Protection and preservation of wild life not only includes preservation of trees and forests but also planting of fruit bearing trees that serve as foods for diversity of wild life.

In these villages, information and notice has been circulated to the general public not to disturb or kill the animal. There is a need to carry out a systematic study on the present status and conservation of faunal diversity in these community conserved forests to ensure conservation and protection of these valuable biodiversity in a systematic way.

Participation of NGOs in biodiversity conservation

Conservation ethos is highly interwoven in the cultural, spiritual and religious background of the Mizo society. The collective strength of the NGOs should be treated as an opportunity. Mizoram is lucky to have YMA (Young Mizo Association), which has established several conservation reserves in many biodiversity rich areas of the states and doing a yeoman service in the conservation of flora and fauna (Bisht, 2011). NGOs have core competencies in their respective areas and these skills must be synergized. Some of the NGOs actively involved in the biodiversity and environmental conservation in Mizoram are Young Mizo Association (YMA), Centre for Environment Protection (CEP), Biodiversity and Nature Conservation Network (BIOCON), Mizo Post Graduate Science Society (MPOGRASS), Science Teachers Association of Mizoram (STAM), Association for Environment Protection (ASEP) etc.

CONCLUSION

Mizoram has varied climate condition that supports variety of flora and fauna to coexist and interact with each other. This process has led to speed up the process of evolution of species. Due to variation in the climate, topography and soils characteristics, the state is rich in varieties of natural ecosystems and the species. As a

result of human interference like over exploitation and mismanagement of these natural ecosystems owing to shifting cultivation, the equilibrium of these ecosystems is disrupted basically due to the elimination of the species. Number of *in situ* and *ex situ* conservation efforts are being made over the World to rebuild the natural ecosystem equilibrium by conserving the species in disturbed ecosystems.

Mizoram has unique biodiversity conservation efforts through community participation at the grass-roots level and still local communities trust upon traditional institutions for biodiversity conservation. Though a large portion of community-owned forests have been degraded over the last five decades. It appears that because of the population pressure and to get financial help the misuse of the forest resources in many ways like shifting cultivation, extraction of species from the natural forest areas for timber, medicine and food are increasing. There have been several instances of misuse of traditional rights by village leaders and the general public. However, the general opinion about such degradation/deforestation was not abetted by a large majority of the villages function within traditional institutions. More responsibilities of village forests management may be given to the local communities and institutions, which are most knowledgeable about the locality and the forest resources in the area. To ensure effective forest conservation in Mizoram, initiation of any programs or schemes should be oriented to meet the specific needs of the diverse people in a community by promoting inter-village cooperation.

The present paper clearly spells out that existence of local institutions like YMA is crucial for the success of community forests management in Mizoram. Traditional knowledge, practices and institutions are an important element of social capital and help build and sustain this capital in a community. Further, there is a need to develop mechanisms and processes that can bring government officials, scientists and the local institutions to explore formulating a policy that will support local communities to act effectively as custodians of the village community forests. It is important that the community forests are legally owned by the rural villages with properly revised rules and regulations of community forest in Mizoram to maintain the ecosystems equilibrium.

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TRADITIONAL KNOWLEDGE AND NTFP UTILIZATION: THE AADI AUSHADHI MODEL

Lancelot D'Cruz

ABSTRACT

The Bhil Vasava tribals, inhabiting the biodiversity rich forests in the Shoolpaneshwar sanctuary area of Dediapada in South Gujarat, India, despite having a rich tradition of indigenous medicine, yet remain poor in economic terms. **Approach:** The current paper presents the Aadi Aushadhi model, set up as a collaborative venture involving NGOs from the educational, research, pharmaceutical, and the NGO sectors. The overall objective being the holistic empowerment of a core group of adivasis so as to promote their socio-economic development along with ensuring the protection of their traditional knowledge of medicinal plants. The setting up of Aadi Aushadhi has been done in a sequential fashion, the genesis being the ethnomedicinal studies carried out as part of a doctoral thesis. These formed the basis for Phase I: a market study involving the earlier documented medicinal plants along with a study on the current situation of plants in the Dediapada Forest; an irrigation system study, and the initiation of capacity building trainings. Phase II aimed at initiating organic cultivation based on Good Agricultural Practices in 4 pilot farmlands. It focussed on extending the network of Aadi Aushadhi members, improving their farm lands, and enhancing their commercial, administrative and marketing skills. With individual members beginning cultivation of medicinal plants in their own lands in Phase III, emphasis was placed on improving processing and marketing of products as also the creation of a brand name. Aadi Aushadhi focussed on harvesting, storage, licensing, packaging and better marketing including e-marketing in Phase IV. **Results:** The Aadi Aushadhi group manages an office and a processing and unit at Dediapada, marketing traditional medicines at local fairs and state level outlets. Diversification into value added (medicinal) food products involving some NTFP elements has enhanced brand value and economic gains while attracting National and International attention. **Conclusion/Recommendations:** The Aadi Aushadhi model shows how a holistic, community based approach to medicinal plant cultivation and preservation while integrating traditional medicinal wisdom and creatively utilizing NTFP potential can effectively impact socio-economic development. The way forward would be to upscale the Aadi Aushadhi movement thereby effectively empowering tribals and turning them from traditional tribal healers into entrepreneurs.

Keywords: Ethno-medicine, biodiversity conservation, entrepreneurship, NTFP, socio-economic development, traditional knowledge.

INTRODUCTION

The *Bhil Vasava* tribals inhabiting the biodiversity rich Dediapada forests within the *Shoolpaneshwar* sanctuary area of *South Gujarat* have a rich tradition of indigenous medicine. An estimated one hectare in these 59,312 hectares of sprawling forest cover area is reported to house 1,200 forest species (D' Cruz, 2002).

Dediapada is situated about 70 kms. east of Ankleshwar on the Western Railway main-line connecting Mumbai with Ahmedabad. Dediapada is a backward tribal taluka – economically, educationally, socially, and politically. It has low literacy rates among its 95% (2001 census) tribal population –21.14% (Gujarat 43.70%) in 1981, and 36.45% (Gujarat 61.29 %) in 1991 and 48% (Gujarat 69.9 %) in 2001. This is another significant factor which necessitates the documenting of their ethno-medicinal wisdom, since it essentially resides with the elderly practitioners who pass it on by means of oral tradition. The Taluka covers 1027 sq. kms. and has 1,43,303 inhabitants with 76% of families in the taluka living below the poverty line (BPL families) (2001 census).

The genesis on the present intervention can be traced back to the ethnomedicinal studies carried out as part of a doctoral thesis involving the active collaboration of St. Xavier's College, Ahmedabad with the Adivasi Samajik Kendra situated 270 kms away at Dediapada. A project titled "*People-forest-laboratory linkages for conservation of ethnomedicinal biodiversity*", was financed by the Gujarat Ecology Commission and implemented by the Xavier Research Foundation (Ahmedabad). This involved the setting up of an interactive network of medicine men which documented their traditional ethnomedicinal wisdom, resulting in the preparation in CD-format of the 100 most significant *Vasavi* medicinal plants. The group also set up five 'medicinal plant forests' in the vicinity of five tribal schools and ensured the use of these for environmental education. The doctoral work included conservation aspects like the use of plant tissue culture and DNA fingerprinting for conservation of threatened ethno medicinal plant species (D'Cruz, 2002).

The outcome of the project was the subsequent creation of three self-help groups composed of Vasava men and women from the Relwa, Dediapada and Nani Singloti village areas. In October 2006 the self-help groups (SHGs) started discussing about their medicinal plant collection activity and the obstacles they faced. These included: vulnerability because of illiteracy, low self-confidence, ignorance of the functioning of the market, dependence on rain-fed irrigation, inability to market materials, and exploitation by middlemen. They decided to improve their situation by organizing themselves under the banner of 'Aadi Aushadhi' and by trying to cultivate and produce plant products and sell them directly.

The current paper presents the Aadi Aushadhi model, set up as a collaborative venture involving NGOs from the educational, research, pharmaceutical, and the NGO sectors. The overall objectives being the holistic empowerment of a core group of adivasis so as to promote their socio-economic development along with ensuring the protection of their traditional knowledge of medicinal plants. The setting up of Aadi Aushadhi has been done in a sequential fashion, as explained below.

MEANS AND MATERIALS

A novel methodology involving the setting up of an interactive, collaborative network of active tribal medicine men (drawn from almost twenty villages within the Dediapada forests) meeting over thirty five interactive sessions was used to confirm, cross-check, verify, and systematically document the ethno-medicinal flora of the

Dediapada forests. The group also helped set up and utilize the five 'forests' or medicinal plant enclaves set up around five schools for ethno-medicinal sensitisation of tribal students through interactive workshops.

Subsequent to the Gujarat Ecology Commission project, a group of thirty five men and women participated in a workshop aimed at promoting entrepreneurship and leadership and conducted by MANTHAN (MEPS, a nongovernmental institution, headed by Mr. Abhay Kothari). They were assisted in organizing themselves into 3 SHGs linked to form an organizational unit called 'Aadi Aushadi'.

The first phase which commenced in October 2007 included an in-depth Market Research Study and Business Feasibility Survey for the commercialization of herbal products carried out in two phases by Sky Quest Labs Private Limited (headed by Mr. Akash Bhavsar). A botanical study was carried out by Dr. M. R. Almeida and Mr. Santosh of the Blatter Herbarium, St. Xavier's College, Mumbai, to review and update the list of ethno-medicinally valuable plants of the Dediapada forests. The group members were trained by Jeevan Tirth (an NGO with expertise in water harvesting, headed by Raju-Dipti) to understand the basics of water harvesting and to apply these principles to their own lands. Workshops on capacity building and training in administration, management and marketing were also imparted to the group members.

The setting up of 4 pilot farms to demonstrate medicinal plant cultivation to the group was initiated in Phase II. This involved hiring labourers for cultivation and the setting up of small nurseries at two different places. Funds for the setting up of a small office and a basic processing unit in a convenient place in Dediapada were also obtained and the process of setting up both units was initiated. A study on the Good Agricultural Practices (GAP) of the selected plants was undertaken by Mr. Francis Macwan who was specially inducted at this stage to train the groups in GAP and organic cultivation.

The specific objective of Phase III, which emerged as the logical outcome of phase II, was the implementation of the productive activity of the Aadi Aushadhi members. This would be achieved through helping the adivasis cultivate, process, store, and market their medicinal produce, through an adivasi-run cooperative initiative based in Dediapada, with linkages with other similar groups aimed at expansion of the initiative in the area.

In this phase, special training in Office management, documentation, accounting, presentation and marketing was imparted to 3 persons to enable them to effectively run the Project Monitoring Unit (PMU) at Dediapada. To create a bigger network, meetings with other SHGs/ groups were held and the training of 10 selected SHG members as master trainers was undertaken. The use of the internet and modern technology, creation of a web-site and the preparation of a documentary film were some of the means used to spread the group's message. The group continued to visit local fairs ('*melos*') even as new marketing avenues were explored. They were also trained to prepare of a wide range of products, effectively making use of local ingredients.

The group was helped to undergo an exercise in strategic planning in Phase IV, so as to help them map the way forward. Specific help provided during this phase included assistance for harvesting, storage, registration, licensing, packaging and better marketing including e-marketing.

KEY FINDINGS AND EMPIRICAL OBSERVATIONS

Over 250 plant species of ethno-medicinal significance belonging to over 75 families were documented as part of the detailed studies of the ethno-medicinal wisdom of the Vasava tribals (D'Cruz, 2002). Additions were made to the contemporary knowledge of the flora of Gujarat by adding to the Flora of Gujarat State by G.L.Shah (Shah, 1978), the comprehensive list of Plants of Gujarat (Biological Diversity of Gujarat, GEC, 1996), the Eco-Environmental Studies of Sardar Sarovar Environs (Sabnis and Amin, 1992) and the 'Medicinal Plants of Gujarat' published by the GEER [Pandey (2005), D'Cruz (2009)].

Several of these ethno-medicinal plants were introduced into the five 'forests' set up with the active involvement of the medicine men and tribal children in the local schools. These were used for conducting a number of interactive workshops to sensitize the children to their traditional knowledge and ethno-medicinal wisdom.

The entrepreneurial training workshops held subsequent to the GEC project, resulted in the creation of three self-help groups, one entirely of women. The groups decided on a name '*Aaadi Aushadi*' (meaning 'Original Medicine') and a product logo. They began to devise and implement small strategies for the local sale of medicinal products.

The first phase focused on a market study involving the earlier documented medicinal plants. It included an exploratory survey and a descriptive market research study which were completed in 160 days. 25 plants out of the 250 listed plants were identified based on a literature survey and on secondary research keeping in mind availability, commercial and/or medicinal importance and novelty. The list of 25 was narrowed down to 10 plants in the second phase which included product sampling activity and a business feasibility study, completed from days 160 to 190. A parallel field study was undertaken by Dr M. R. Almeida and Santosh Yadav, resulting in a computerized data base of the information along with the herbarium sheets of all identified species. Three lists of plants were drawn up: one with 115 important plants of Dediapada; a second with 45 economically important plants and a third with 30 plants suggested on a priority basis. Ten plants were selected for cultivation through a consultation involving the Market Survey experts, the botanical specialists and the local adivasis. The above process was an interesting attempt to utilize traditional knowledge and modern day study techniques to confirm selection of plants which could be cultivated. An economically handicapped group was able to access methodologies would have been normally available only to Pharmaceutical companies for such choices.

The cultivation of medicinal plants in the lands of all members would require inputs for soil improvement and for water conservation. The Need Assessment and Feasibility studies, carried out by one of the partner NGOs Jeevan Tirth, were utilized to help the members draw up plans for their own lands, and subsequently implement them. The group was also imparted trainings to enhance their business skills through workshops dealing with issues of sales, pricing, customer satisfaction, etc.

Phase II aimed at initiating organic cultivation based on Good Agricultural Practices in 4 pilot farmlands. A study on the Good Agricultural Practices for the ten selected species was undertaken by Mr. Francis Macwan, an expert on medicinal plants, who was inducted into the team. Trainings for preparation of organic manure, liquid manure and bio-pesticides were given to all the group members through hands on training workshops.

Aadi Aushadhi proceeded to set up a small office in January 2009 in a rented, shopping complex in Dediapada. It was manned by three members, under the supervision of the local coordinator. Apart from the office furniture and a computer, processing equipment like a fluid Bed Drier (STD Model) along with a 24 Tray Drier Machine and a Multi Mill GMP Model (RDMM) Machine were installed.

In Phase III the group members began cultivating medicinal plants in their own lands. Having being trained to deal with the plants from sowing to harvesting and storage and also with nursery management and GMP, they began to market some of their traditional medicines. They were helped to improve their packaging and labelling. Medicines were sold at the Dediapada office as well as at local and state level fairs. These events involved a great deal of planning; they were good “practical opportunities” for the group to practice what they had learnt in the trainings. More importantly, it has helped the group get a good deal of publicity and led to an increase in self-esteem. A number of people from all parts of Gujarat- Anand, Ankleshwar, Bharuch, Gandhidham, Kutch and Surat besides the tribal areas of Songadh, Mandal, Unai, Vyara and Zankhvav have contacted the group through the contact number provided on the distributed ‘patrikas’ (pamphlets).

By way of capacity building, 10 selected SHG members have been trained as master trainers who will be involved in the process of expanding the Aadi Aushadhi network. A documentary on the group’s activities and achievements has been prepared for this purpose and is accessible on the web site www.aadiaushadhi.com. The core team was also involved in a 2-day Strategic Planning Workshop where the group laid down a strategy for the immediate future. By now the group had moved into Phase IV where they focused on better harvesting and storage techniques; issues of licensing, packaging and better marketing including e-marketing were also dealt with.

A significant step in the Aadi Aushadhi journey was a decision taken in December 2008, to diversify to the making of value added food products. The occasion was the Traditional Food Festival held annually at the prestigious Indian Institute of Management (I.I.M) in Ahmedabad. In the 2008 event, the group prepared traditional adivasi food items and earned a net income of Rs 37,000/-. At the 2009 I.I.M. Food Festival, the group earned a special prize for its ‘Brahmi products’, besides

accomplishing sales of Rs 53,820. 'Brahmi' (*Centiella asiatica*) was one of the ten plants suggested for cultivation in Dediapada in the Phase I survey. It was not cultivated in Dediapada earlier. The preparation of 'Brahmi Khakras' has proved to be popular and Aadi Aushadhi continues to market these to this date. Similarly, another significant plant used was 'Khati bhindi' (*Hibiscus sabdariffa*) which is normally cultivated by tribals only for family consumption. A tasty 'sherbet' (drink) as also 'Khati bhindi jam' were popular items introduced by the group.

For the 2010 Food Festival, the group went a step further and decided to focus on a NTFP abundant in that area- Mahuda (*Madhuca indica*). After a lot of planning and experimentation, a number of 'Mahuda' products were marketed and sold during the 3-day festival. These included Mahuda biscuits, muffins, bread, puffs and a special Mahuda icecream. The sales touched a record Rs 1,65,000/- even as the Mahuda products attracted wide attention. It must be noted that in Gujarat, the GSFDC enjoys exclusive rights for procurement, transport, storage and marketing of 13 nationalized items, one of these being Mahuda flowers/seeds (Kamboj, 2008). Apart from using Mahuda for a variety of purposes, the tribal community also prepares an intoxicating drink. Mahuda has acquired a 'bad name' on this account. Gujarat State has a law that proscribes sale, purchase and consumption of alcoholic drinks. Aadi Aushadhi attempted to make a statement: that Mahuda has immense potential to be used in a variety of food items, ranging from bread and biscuits to icecream. These could be a source of considerable income to the tribal community. The December 2011 food festival saw Aadi Aushadhi cross sales of Rs 2 lakhs through sale of Mahuda ice cream and Mahuda biscuits in just three days. However, there is need for a rethinking of policy at several levels for this to happen.

Aadi Aushadhi members also collected and sold flowers of 'Khakro' (*Butea monosperma*). These are presently not purchased by the State Forest Department. Paid a fee of Rs 6/- per kilogram, the group sold flowers worth Rs 18,000/- in March 2011. With better planning and a more focused collection, the group earned over Rs 60,000/- in March 2012, netting Rs 10 per kilogram. This is another example of how the potential of NTFP can be transformed into economic benefits for the local adivasis.

Aadi Aushadhi currently produces about 25 'medicines' (from traditional tribal recipes). The raw materials for these preparations are again NTFPs like *Tinospora* (Galo), *Costus speciosus* (Pevu) and other medicinal roots and barks which were formerly collected; they are now being put under cultivation. These materials are dried, powdered, processed and mixed in the appropriate proportion. The packages are then attractively packaged and marketed (cf Aadi Aushadhi website for more details). Another set of NTFP materials like leaves of *Wrightia tinctoria* (Dudh kuvdi) were supplied to a Pharmaceutical company and netted the group an income of Rs 37,000.

Currently, Aadi Aushadhi seeks to formalize itself as a legal, structured entity while ensuring its effective running. It also seeks to expand to include 150 core members within a 2 year period. Interventions in Phase V will target the strengthening of coordination at the local level, and marketing support at the wider level with emphasis on enhancing the group's abilities to increase production, market outlets and to attain targets. Issues of patenting, licensing will also be addressed.

CONCLUSION

The Aadi Aushadhi model shows how a holistic, community based approach to medicinal plant cultivation and preservation can effectively impact socio-economic development. It demonstrates how integration of traditional medicinal wisdom and creative utilization of NTFP potential can ensure livelihood security and reduce migration while promoting the health and integral development of indigenous peoples while ensuring preservation of their indigeneous knowledge and their forests. The way forward would be to upscale the Aadi Aushadhi movement thereby effectively empowering tribals and turning them from traditional tribal healers into entrepreneurs.

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CONSERVING INDIA'S BIODIVERSITY THROUGH THE USE OF TRADITIONAL KNOWLEDGE: EXAMPLES FROM NORTHEAST INDIA

Pranab Pal

ABSTRACT

Traditional Knowledge (TK) connected among natural resources is an insubstantial factor of the resource itself. In an gradually further teeming woved by way of broadly contradictory group of people benefit and vulnerabilities, progress and running of natural resources calls for a nearly all unbiased move toward receptive to extensive –expression wellbeing of confined and regional communities as well as to existence on globe as a entire. This opinion is the entire budge imperative at the moment as we continue to colonies each accessible natural riche on gravel to the point of destabilizing their precisely impartial mutually dependent structures, thus triggering unfavorable irreparable ecological changes and revealing entire populations to new-fangled risks. According to specialist (Me Neely, J.A. et al 1990) expected the 70% of the world's entire flowering plants take place in twelve mega-biodiversity countries of the earth. By means of only 2.4% of the soil area (Khoshoo, 1996) India by now accounts for 7% to 8% of the recoded species of the world. India is a main section of biodiversity. The majority of the populace in our nation force their livelihoods and convene their needs from the assortment of living wage resources-as farmers, fisher folk, healers, information systems in medicine cultivation and fisheries still while deserted, are the main pedestal for assembly the food and health desires of the preponderance of our citizens. More than 47,000 variety of plants and 81,000 species of animals have been recorded in India. Protection of Biodiversity is warmly liked to indigenous knowledge systems on the solitary dispense and people's rights to defend their acquaintance and possessions on the additional hand. Biodiversity is endangered and battered people's rights and people's knowledge are also in danger and eroded. Environment devastation due to globally financed mega- projects such as the edifice of dams, highways, removal and aquaculture in areas wealthy in biological diversity. Scientist express through UN environment Programme 1970, those animal populations by 30% the vicinity of mangroves and sea grasses by 20% and the reporting of living wage corals by 40%. The decline in biodiversity is environment invasive alien variety. Over exploitation of natural possessions and toxic waste, people are to culpability for all of these. Inability to control the wide-reaching fishing trade provides the most obvious example of unsustainable use of natural resources. Without essential measures, saleable fishing may not stay alive further than 2050. The Himalayas has utmost scale of endemism of subcontinent. It has probable 3165 endemics (Chatterjee, 1940) for the whole Himalayas and it is convinced that the eastern Himalayas have stronger endemism than the western Himalayas. In the Biodiversity Scenarios of the North Eastern States has a tremendous significance.

Key Words :-Indigenous knowledge, Northeast region, biodiversity, extinct, Threat

INTRODUCTION

Protection of natural diversity has been widespread in India as instant immemorial and has commonly been mentioned in Vedas and further antique scriptures. India is recognized as a country exclusively affluent in all aspects of forests owed to a great evaluate of ecological situations by desirable quality of its tropical position. The citizens of early India had a attraction and deference for its nature tradition. Significance of biodiversity conservation was realized yet through the 3rd century B.C. The Biodiversity have a vital on the biological protection and radiant creature of the northeast India and its people. Mountains are worldwide essential as ecological possessions and natural rich landscape with composite and climate and weather region. India has two punch spots that is to say (Srivastava, 2012). Presently 500 million cultivators effective on conspires of not as much of than two hectares, 60 million original people alive within steamy forest and 150 million deprived public reliant on livelihoods connected through fisheries.. The Practices of shifting cultivation and agriculture in the river valleys are motionless widespread in the Northeast India. The North eastern comprising eight states, (Fig: 1) namely: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura, is able through wealthy forest possessions. These Societies have also retained a integer of sacred tents on defense of their biological diversity in anticipation of these days. The people of Meghalaya accept as true that defense of sacred groves and sacred trees (Banyan and Peepal) symbolize extensive ritual of ecological management based on indigenous knowledge by the tribal communities of Meghalaya. Preserving the pockets of Biodiversity in an assortment of parts of the nation was a put into practice, regularly in excess of a part of temple land called sacred grooves, enthusiastic to confined duties. The Meghalaya is strappingly whispered to be an indigenous knowledge, urbanized and perpetuated by the indigenous people of the state-Khasis, Garos and Jaintias. On top of such species is *Kunstleria keralensis* that survives at the present in sacred grooves only. The community of Arunachal Pradesh preponderance of the rocky population of state depends in the lead agriculture and forest possessions for their livelihood, which these communities continue with their affluent and diverse traditional ecological knowledge. The state is home to 26 key tribes and about 110 cultural groups. Imagination and innovativeness of the waged people level people in biodiversity conservation (Chaudhury P, et.all 2011) has been debated for a extensive moment. The shifting cultivators in Churachandpur district of Manipur, worn to place oblique 10 to 30 % of the forests inviolate a sacred grove throughout their shifting cultivation sequence prior to their adaptation to Christianity in 1950. Consequent to the religious Conversions, such groves were cut off. Afterward on, the communities felt the significant of these groves (Gadgil, 1996) in their daily lives and another time rehabilitated them as protection forests. The Eastern Himalaya, Lachung and Yumthang valley in North Sikkim higher than (2,700m) thick varied moderate wide leaved and diverse coniferous forest take place. The native people are unswervingly reliant on the natural resources which are the major reason of forest destruction. Owing to which the one of the *gymnosperm taxon*, *Taxus baccata* is opposite a danger of extinction as is used for treatment of bronchitis, asthma, epilepsy, snake bites, scorpion stings, aphrodisiac, persuade perspiration, internal injuries, lung diseases and diabetes. The Nagaland forests on young folded mountains of Himalayan system. Fifteen tribes of the state present a microcosm of the enormous Indian actuality through agreement in assortment

as its guiding opinion. The major profession of the people of the state is agriculture, jhum water corpse and follows land. The Chakhesang tribe worn frequently mammal derivative medicine for the treatment regularly of injury, skin burn, pain, bone fracture, dislocation, gastritis, fever, arthritis, Constipation, cough, child delivery, body swelling, malaria, asthma, chicken pox, (Sharma and Khan, 1995), 1995 liver trouble, eye action and growth. Large number tribes exist generally on hill-tops and on slopes forming diminutive and remote villages. Nearly all of these villages are situated at isolated and remote away from the towns consequently, the people generally depend on the usual possessions from the close at hand forests for their livelihood such while food, clothes and shelters together with the uses of medicinal herbs *Acacia pinnate*, *Albizia procera*, *Bauhinia variegata*, *Papilionaceae* etc for treatments of diverse diseases and ailments. The Traditional Knowledge of medicinal herb is cramped to confined medicine men. The medicine men have accomplished and developed this acquaintance of the uses of medicinal herbs while their age long trial and blunder methods and conceded on vocally from one production to a further.

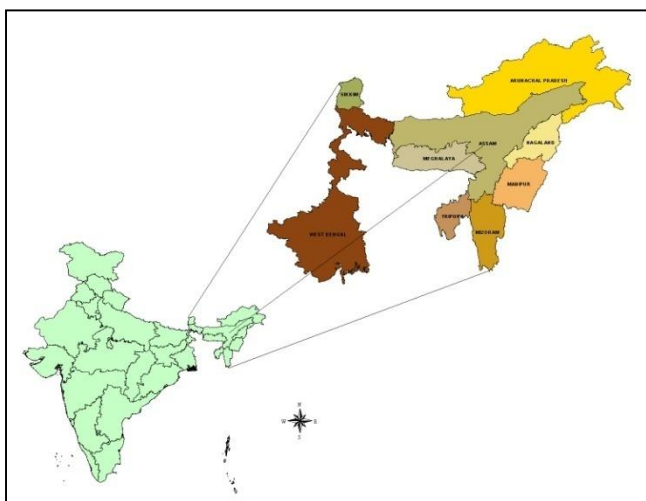


Fig:1 Location Map of the North -Eastern States

According to World Health Organization (WHO) not fewer than 20,000 species of plants (Gupta and Chadha, 1995) are worn as medicinal plant and 80% of the inhabitants in the rising countries depends (parcek, 1996) in a straight line on plants for its medicine. Precious heritage of herbal medicines the length of through its ethnic diversity and these diverse groups of racial community living in remote forest areas immobile depends to a immense scope on the indigenous systems of medicine (*Baccauea amniteora*, *dysaxylum gobaa*, *Musa paradisiacal*, *Tamarindus indica*) in excess of the past decade herb medicines has turn into a topic of worldwide meaning in all corners of the world. The North East region is mostly undulating through opaque forests and uneven terrains and consequently, ethno botanically least explored. The chronological description of Karbis is mainly disjointed owing to be short of written olden times. Available evidences nevertheless, propose forests as their natural habitat and they completely depend on forest for all necessities (food, medicines, fiber, raw materials, dyes, soaps, detergents etc) . Their major form of farming is immobile the

epoch the hills. Rice is the staple food supported by wild plants (roots, tubers, leaves, flowers and fruits). The present paper thus aims to highlight in detail the affluent traditional practices in the North East India on the uses of plants.

BIODIVERSITY IN NORTH EAST REGION

India is one of the 17 mega biodiversity countries in the earth having two hotspots the Western Ghats and the Eastern Himalayas, support on species infrequency and endemism. It is prosperous traditional knowledge connected to Biodiversity, which is usually in community area. Our biological resources and traditional knowledge and suitably evidence the identical to set up our ownership. The North East region has been in focal point for its elevated biodiversity and this area has been a main concern for most important upkeep agencies of the world. The area is currently under grave risk from anthropogenic behavior. The entire forest cover within the region is 173,219 sqkm which is 66.07% of its geographical vicinity in contrast on the way to the nationwide forest wrap (Fig: 2) of 21.05%. The region has been recognized as one of the 18 biodiversity hot spots of the earth. Shifting cultivation has traditionally been (FSI, 2011) the major starting place of livelihood of the tribal community and is intricately connected to their socio-cultural life. The North East traditional Knowledge is for conserving the resources in usual systems. The region has concerning 876 orchid species is 151 genera which comprise more or less 70% of the total orchid flora of our country. A hefty fact of ornamental unusual endangered and threatened orchid *Paphiopedilum*, *Cymbidium*, *Bulbophyllum*, *Dendrobium*, *Hexandrum* species are accessible in this region. Arunachal Pradesh, incredibly perfect situation for vegetation growth, high temperature, rainfall and humidity hold up very opaque increase of plants which is very assorted. Vegetation are classified (Champion and Seth, 1968) in Arunachal Pradesh five categories (i) Moist tropical forests (2) Montane Subtropical forests (3) Montane Temperature Forest (4) Sub-alpine forest (5) Alpine vegetation. The state estimated that more than 5000 species of flowering plants occur in this area and 85 terrestrial mammals, over 500 birds and a huge number of butterflies, insects and reptiles. The state in just one of its kind in having traditional privileges of a assortment of tribes in glut of land, water and forest by means of in their justifications. Every tribe has a assembly of people excises control over the customary resources protection, crop growing, food and other day to day varied uses. The state of Assam is a ingredient component of the Eastern Himalayan Biodiversity region. The climatic situation and extensive assortment in corporeal facial appearance witnessed of Assam have resulted in a variety of ecological habitats such as forests, grassland, wetlands, which harbour and continue broad ranging floral and faunal species insertion. According to champion and Seth Assam can be depict seven vegetation types/sub-types. These are (i) Tropical wet evergreen- Forests (ii) Tropical Semi Evergreen Forests (iii) Tropical Moist Deciduous Forests (iv) Sub -Tropical Broad leaf Hill Forests (v) Sub-Tropical Pine Forests (vi) Littoral and Swamp Forests (vii) Grassland and Savannahs. Assam is wealthy in bamboo diversity, where 10 genera and 42 species can be originated. The state concerning 193 species of mammals and added than 958 species and type of birds are so distant evidence (Coudhury, 2000) Assam grasps the whole identified earth populace of the Pigmy hog, 75% of the world population of the Indian Rhinoceros (*Rhinoceros unicornis*) and Wild buffalo (*Bubalus bubalis*) and a considerable inhabitants of Asian Elephant (*Elephas maximus*) and Tigers (*Panthera tigris tigris*),

in attendance are plentiful information of Gangetic Dolphins, Mongooses, Giant Squirrels and Pythons.

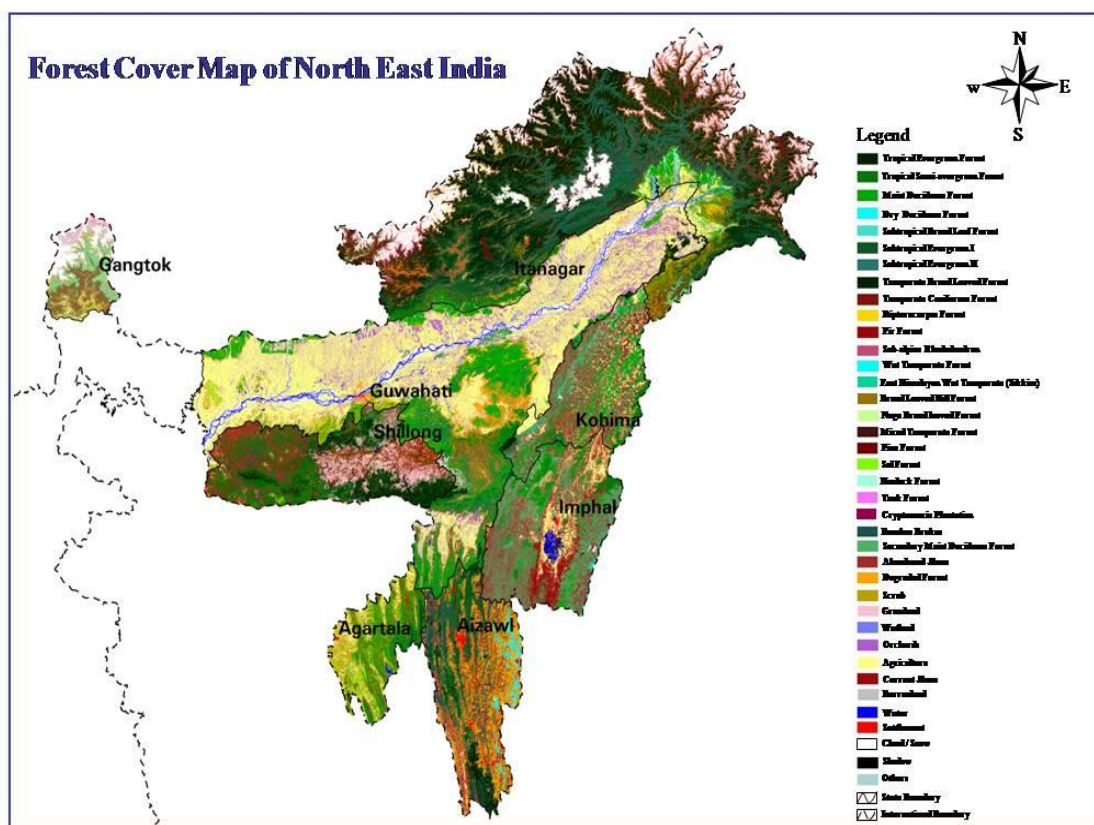


Fig : 2 Forest Cover Map of North East India

Source : IIRS ,2002

Assam is remarkably affluent in citrus and banana germplasm. Assam is furthermore identified for Orchids and also for precious plant species and forest product. Assam Biodiversity comprises the spotted deer or chital (*Axis axis*), the Swamp deer (*Cervus duvauceli duvauceli*), the clouded Leopard (*Neofelis refulosa*), the Golden langur (*Trachypithecus geei*). Assam encompasses consequence in an assortment of ecological habitats such as forests, grasslands wetlands which harbor and continue extensive ranging floral and faunal species placing. More than 900 avian species are belonging to 302 genera and 68 families. The state has as numerous as 3513 freshwater wetlands. There are 3017 species of flowering plants. Meghalaya biodiversity is usual and it includes of a massive species of flora and fauna. Around 8514 sqkm of the total land area of Meghalaya are being below the wrap of forests. The state has 98 wetlands of the size 2.25 ha and on top of swathe a total area 22.21 sqkm and as well wettest state in India. Several small serial rivers are flowing crosswise the state thereby making it for farming. The floral diversity embraces a great assortment of trees and shrubs, parasites and Epiphytes and succulent plants. Concerning 47 species of swamp birds have been evidence. More than 35% of Indian mammals species are originate in this situation. Biodiversity of Meghalaya includes an ample range of reptiles, mammals, insects and birds. There are roughly 250 species of the multicolored butterflies in Meghalaya. The nearly all noteworthy flora of Meghalaya are orchids. The state biodiversity is a wonderful equilibrium in the ecosystem of Meghalaya. Mizoram is 21,081 sqkm which is 0.64% of the country's geographical vicinity. The

state has a climate ranging from humid tropical to moist sub-tropical, not incredibly temperate in summer and not very cold in winter, sanctuaries covering an area of 1,241 sqkm which comprise 5.89% of the state's geographical area. The state has 134 sqkm areas beneath awfully opaque forests 6,086 sqkm area underneath reasonably impenetrable forest and 12,897 sqkm area feeble and unbalanced, prone to common seismic exploit. Soils vary from covered in dust loam and clayey loam. Soils are porous with deprived water-holding aptitude, shortage in Potash, phosphorous, nitrogen and smooth humus; severe leaching makes then acidic to normal, Timber and bamboo are in the midst of the vital forest products. Nagaland is very wealthy in bio-diversity. The forest area of the situation is 9,222 sqkm which is 55.62% of its geographical area. The reserved Forests comprise 0.93% protected forests 5.51% and unclassed forest composes 93.56%. The state recognized to be the northern the majority tropical forest arrangement of the earth and the forests are classified as the northern tropical wet evergreen forests, northern tropical semi evergreen forests, northern Sal tropical broad leaved wet hill forests, northern Montana wet temperate forestland temperate forests. According Guinees Book it was documentation world tallest *Rhododendron* tree has been found in Japfu Mountain of kohima District. It was also recorded that tallest rice and most recent chilli are description in the state. There are 22 species of bamboo accessible in the state including *Cdamus rotang*, *Calamus flagellum*, *Calamus erectus*, *Calamusgracilis*, *Calamus floribundus*. Further 340 species Orchids initiate in Nagaland. The majority of the Orchids at this time are *Epiphylte* and *Lithophytes*. The state too affluent medicinal plants present comprise *Panax pseudo-gensing*, *Aegle marmelos* *Ocimum sanctum*., *Rauvolfia serpentine*, *Elaeocarpus genitrus*, *Dioscorea deltoid*, *Taxus baccata* etc. The faunal biodiversity of Nagaland contain a *Melurses ursinus* (Sloth bear), *Prionodon pardicolor* (Spotted linsang, Tiger -Civet), *Macaca assamensis* (Tailed Pig), *Panther Tigris* (Tiger). The Gaur or Indian Bison inhabits in Intangki National Park and Fakim Wildlife Sanctuary. Sikkim only 7,096 sqkm geographic part, underneath a modest in excess of partially a million inhabitants , the Sikkim state has an altitudinal range unreliable from 300m to 8586m on top of see level, on behalf of tropical, sub-tropical, temperature and alpine regions and a diminutive segment of cold desert. The state has concerning 80% of its geographical area, beneath forest wrap, through a predictable above 4500 species of flowering plants. The prosperous floral assortment of Sikkim has enthralled an extensive assortment of Scholars from the entire in excess of the world. At the side of 39% part unavailable by alpine pastures and flurry. Sikkim ropes a hugely well-off reservoir of biological diversity as extremely helpful heritable resource pool. The vegetation ranges from Sal (*Shorea rubusta*) and its acquaintances in the near to the ground elevations, and steadily transitions to oaks, low elevation pines, firs and lastly the high altitude alpine grasslands and meadows. The state depository of above 523 Orchids species and emerged elsewhere as one of the richest hot spots for orchid diversity in Indian Himalaya. Sikkim has added afterward 700 medicinal plants species. Out of the 72 *Rhododendron* Sikkim is recognized to contain 36 species. The state fauna is varied, including 144 mammals, 550 species of birds, further after that 600 Butterflies and Insect, 48 species of Fish, in adding up to numerous reptiles, amphibians and insects. Agro-biodiversity in the form of domesticated animals and cultivated plants is too assorted in Sikkim. More than 80% group breathing in rural areas. The state represents four main altitudinal sectors of vegetation. (1) The Tropical eco-region (2) The Sub Tropical eco-region (3) The Temperate and alpine eco-region (4) The Trans-Himalayan

eco-region. Sikkim is under PA 2,179.10 sqkm and state have numerous marshland which give grave water bid environment, the procedure of applying for RamSar place status for three swamp composite have been initiated. Manipur through its soil area 22,327 sqkm lies among the latitude of 23° 83' N-25°68'N and longitude of 93° 03'E-94°78'E in the eastern element of India. The diverse type of weather chains a green wrap from tropical to sub-alpine assortment. The forested hills moreover encompass a quantity of the species of flora and fauna that are wholly originate in Manipur only. The conservation of Manipur's prosperous Biological Diversity (floral, faunal and microbial) and her speckled ecosystems. The state has been the Vavilovian centre of derivation of a multiplicity of angiospermic plants. The forests wetlands make available an assortment of most important and inconsequential forest products and medicinal plants. The area is a living museum of tribe's dialogue thirty one diverse dialects. The people of Manipur are a merger of numerous cultures precise to the tribes flourishing in this state. The region has 29 scheduled tribes, Meitei Pangals and the Meiteis. The Meiteis comprise the most important group of the public in the gorge districts. Manipur Biodiversity necessarily associated through environment and ecology safety. Tripura state has a total area of 10,169 sqkm elsewhere of which 6,168 sqkm is unavailable by forest. The state extensive multiplicity of wild animals belonging to different groups is established in Tripura. The richness of fauna might be accredited to its inimitable bio-geographical place and Zoo-geographical position. The forest wrap dwindled from 76% to 30%. The area occupies 0.32% part if India and accounts for 12.78% of the plant possessions species establish in the country. The specialist recorded 56 mammalian species belonging to nine information and twenty families. Seven primate species have been recognized in Tripura out of a total 15 found in India. Ornithofauna encompass 342 reported species in the state. The migratory birds are reported to be of 58 species. Tripura is far above the ground diversity of birds of prey, birds, mash birds and flower peckers. In the marine ecosystem 47 species of fish have been recorded. In Tripura 15-20 domesticated species are pragmatic. Nearly all of these species are indigenous. The forest of Tripura has been classified as evergreen and deciduous. The evergreen type has been diminishing of adaphic types, bamboo (42 species are present), cane bamboo, grassland are important. The phayre's leaf monkey (locally known as "Chashma Bansar") has a extremely constrained distribution in India and is found in Tripura. Tripura has pretty high agro-biodiversity with 47 Indigenous category of rice. The state has got five biotypes of maize, creature the less important centre of origin of maize. According to state govt. identified as numerous as thirty one bio-diversity hotspots in this region. Traditional perception of environment was a balanced thought of appropriate use with conservation. This traditional thought used to be reserved animate either orally, through songs or rituals and festivals.

TRADITIONAL KNOWLEDGE RELATING TO USE OF FLORA AND FAUNA

Biodiversity and Traditional Knowledge, which is element of the sequence, community plants, is a vital steer to best put into practice biodiversity conservation at the neighborhood stage for fledging and knowledgeable researchers animate. North East India has a precious tradition of herbal remedies. Its pastoral people and tribal's living wage in isolated/Forest areas motionless depend to an immense scope on the indigenous systems of medicine /crop growing. According to study a huge statistics of extensive assortment of plants through ethno botanical worth are against a number of

extremely imperative diseases. The ethno botanical aspects in the region might afford consequential conduct for the endorsement of traditional herbal medicinal plants/ land races of yield plants for the advantage of humankind at great. According to revise tribal region and tribal communities in the northeast are beneath see the sights or unexplored through stare to their ethno botanical feature. In India, more than 300 wild plant species are used as auxiliary food/ vegetables by tribal's and somewhere else if 800 plants, at slightest 250 plants be able to developed as a new-fangled sources of foodstuff in the next to scene. Concerning 300 wild edible plant type have been reported from northeast India. Consequently distant, an assortment of researchers have reported 1350 species of plants worn in ethno medicinal preparations, (Table: 1) 665 species food plants and 899 species of various uses from entire Northeast India.

Table : 1 Ethno medicinal Plant of Manipur

| Sl. No | Name of the Plant | Family | Vernacular Name | Occurrence | Process of Utilization |
|--------|--------------------------------|----------------|-----------------|-----------------------------------|--|
| 1. | Azadirachta indica | Meliaceae | Neem | Roadside, garden | Fresh leaves useful for remedy in fever. |
| 2. | Andrographis paniculata | Acanthaceae | Vabuti | Home garden | The fresh juice of the leaves along with honey is prescribed in fever. |
| 3. | Bixa orellana Linn | Bixaceae | Ureirom | Found in garden | The bark decoction has antipyretic effect. |
| 4. | Cassia fistula | Caesalpniaceae | Chahui | Garden road side | The flower is given in chronic fever. |
| 5. | Canna indica | Cannaceae | Laphurei | Flower garden | The crushed fresh root for fever. |
| 6. | Coptis teeta | Ranunculaceae | Urihangampal | Wild | The decoction of leaves is prescribed in fever. |
| 7. | Cyperus rotundus | Cyperaceae | Shembangkaothum | It is a herb that grows wild | The crushed extract of the roots is prescribed in fever. |
| 8. | Cuscuta reflexa Rcuma longaoxb | Cuscutaceae | Swarnalata | Parasite grows in the tree | The boiled plant is considered in chronic fever. |
| 9. | Curcuma longa | Zingiberaceae | Yaingang | Cultivated in vegetable garden | The juice of the rhizome is useful in fever. |
| 10. | Dactyloctenium aegyptium | Gramineae | Pungphai | Roadside | The juice of the fresh plant is used in fever. |
| 11. | Eclipta prostrata Roxb | Asteraceae | Uchishumbal | Road side, bank of water pool etc | The juice of the leaves, use for fever |
| 12. | Hedyotis diffusa Wild | Rubiaceae | Limorui | Wild nature | The decoction of the plant, use for intermittent fever. |
| 13. | Hibiscus abelmoschus | Mavalceae | Shamal moturi | Vegetable garden | The decoction of the leaves is given in typhoid fever |
| 14. | Helianthus annus | Asteraceae | Numitlei | Flower garden | The decoction of the leaves, flowers with honey is prescribed in malarial fever. |
| 15. | Ocimum americanum | Labiatae | Tulsiamuba | Garden | The juice of the leaves along with the honey is given in fever. |

| | | | | | |
|-----|--------------------------|----------------|------------------|-----------------------------|---|
| 16. | Ocimum sanctum | Labiatae | Tulsi | Garden | The juice of the leaves along with the honey for fever. |
| 17. | Piper bettle | Piperaceae | Panamana | Widely found in forest area | The juice of the leaves along with the honey is useful in fever |
| 18. | Thevetia nerifolia Juss | Apocynaceae | Utonglei | Garden | The outer cover of the fruits is prescribed in chronic fever. |
| 19. | Tinospora cordifolia | Menispermaceae | Ningthou-khongli | Forest area | The extract of the whole plant antipyretic. |
| 20. | Zingiber officinale Rose | Zingiberaceae | Shing | Vegetable garden | The rhizome juice is mixed with honey is prescribed for cold fever. |

The uses of rosaries complete from an assortment of plant fraction by the Meitei community in Manipur are the representation of ritual and mores and are used as stuff or connected to health and /or spiritual practices. Out of the 20 plants, reported to be worn intended for rosaries, 18 plants belonging to 15 families, are used to make well 29 diseases or complications such while fever , gout, urinary disorder, rheumatism, tuberculosis, heart diseases, liver complaint, bronchitis, etc. A number of the rosaries are in addition sold in the confined markets and obtain fine worth. Other than 90% of village dweller discuss with these traditional healers ahead of presence (*Alka Jain, et al, 2007*) healthcare core. The mainstream of the families in Manipur conventionally maintained a hardly any medicinal herbs in their dwelling garden, ponds, etc. In Manipur Tree class contributed the utmost having 42% whereas herbs recorded 33% of the total (Photo :1) medicinal plants. Vegetation are the main plant parts used for the grounding of medicine by the medicine-men (*Maibas*). The majority of the plant parts are harvested beginning the wild.



Houttuynia corda

Fights for Allergies, Bacteria, Asthma
Cancer, cough and dysentery etc.



Centella asiatica

Remedies for Leprosy, It energizes the
central nervous system, It is also useful in
repairing skin.



Sonchus asper

The plant is pounded and applied as a Poultice to wounds and boils



Crassocephalum crepidiodes

Stems use as a vegetable. A Lotion of leaves is used as a mild medicine that strengthens the stomach and excites its action



Melastoma malabathricum

Used to prevent Scarring from smallpox to treat dysentery, diarrhea, piles etc.



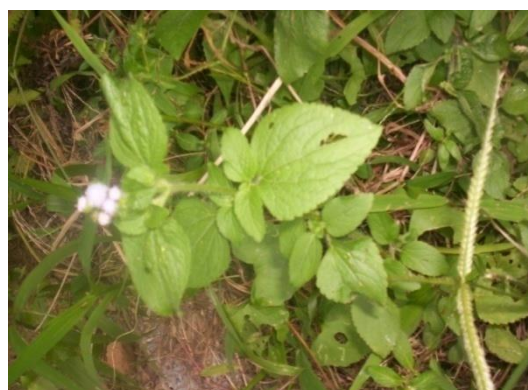
Piper sp.

Plants used as folk and traditional treatment of cough and cold, Bronchitis, Constipation etc.



Adhatoda vasica

Used in Various chest infections. The leaves, roots and flowers used as remedy for cold, cough, Bronchitis etc.



Ageritum conzoidyes

Most common use is to cure wounds and burns. Use this species as a bacteriocide, antilithic etc.



Cannabis

Cannabis use in treating Migraine, Headaches, Asthma, Strokes etc.



Clerodendrum paniculatum

Use as a wounds and skin diseases

Source : Mihin Dollo

According to analysis eighteen traditional dye squashy plants belonging to sixteen families have been reported, which diverse ethnic communities of Manipur make use of for dyeing of their handloom products. In Arunachal Pradesh slash and burn crop-growing use of the local ecological and environmental situation to their improvement. The whole range of their socio-cultural life is consequently natural fiber in the region of Jhum that is not just an agricultural activity as well as means of life. The socio-cultural attitude, magico-religious practices, revelry and rituals connected through Jhum are described, to provide a outlook of their traditional system of agricultural and ground management. The state is known for its affluent bio-resources and ethno-cultural diversity. According to WHO's further than 80% community in increasing countries depend on conventional (*Khongsai, et al, 2011*) medicines for their most important shape require. The situation of Arunachal Pradesh most important festivalated is Losar. Rice and millets are the fastener food. Leaves of diverse wild plants and vegetables are in use in huge quantities. The widespread household animals are pigs, mithun, cattle, goat and chicken through which they can meet their protein necessities. Meat is preserved for an extended era with smoking it over fire. Jhum (shifting) crop growing is the age old indigenous way of development among to facilitate of tools such as *dao* and *hoe* or sticks. Fishing and hunting is one of the main fiscal actions of this undulating tribe at a distance from Jhum crop growing. In Arunachal Pradesh, Fish protein diet prerequisite in a straight line from the untamed sources. Paddy-cum-fish crop growing is experienced mostly by Apatanis, a progressive agricultural the social order of Arunachal Pradesh. In Assam the Koch-Rajbanshi tribe makes use of *Jatropha curcus* Linn. for the action of dysmenorrhoea. Tribal populaces who place into perform fish attractant beside the escapement of fish all through deluge of ponds for the duration of flood, mostly live in the Karbi- Anglong district of Assam. This fish attractant is complete from nearby accessible ingredients such as rice bran, oil cake, jubilee etc. Traditional farming systems are an untapped basis of traditional knowledge. The soil knowledge and folk soil taxonomy managed by the confined people. Rice farmers in Barak valley, South Assam, were inventoried for limited soil acquaintance in relative to rice farming arrangement. Naga tribes have their possess district language and dialect of a exacting animal differs from one tribe to other. In India arrangement of Ayurvedic medicine, numerous plants are worn as ant

diabetics and WHO as well suggested that this put into practice should be (*WHO,1980*) confident, in particular in countries wherever contact to current conduct of Diabetes mellitus is not enough. India, description used for 45,000 plant type ,elsewhere of which further than 8,000 species are worn in a number of 10,000 herbal medicine configuration . Within India, it is predictable so as to concerning 1500 put kind (*Nayarand Sastry,1987*) are in risk, of which on the subject of 124 be in danger of extinction, 81 vulnerable and 100 species contain been affirmed seeing that uncommon.

CONCLUSION

Biodiversity and Traditional knowledge, which is fraction of the sequence, populace and undergrowth, is a necessary direct to greatest – put into practice biodiversity as well as conservation on society stage intended for fledgling and practiced researchers comparable. Biodiversity is nature's planned resistance. Stipulation it were not consequently glowing hidden away, we strength exist extra cautious to protect it. Every part of ethnic tribes of the earth utilize flora and fauna since measure might diverge on or after area toward region. Management of wild orchids is now a day substance of worldwide alarm. There is imperative require to defend the precious orchid type in their usual environment seeing that orchids are awfully susceptible to ecological strife. Conservation measures have to be strengthened pedestal on traditional knowledge and assessment structure through which the local communities might make out the revitalization of the consecrated copse thought to protect the forests which assist to conserve the orchid diversity present in this region as nature's contribution. Traditional knowledge resting on maintenance of orchids of the confined community of Northeast region motivation be obliging intended for sustainable orchid resource running of this area. Traditional knowledge in reality is the mainly valuable quality of northeast community and contain astutely browbeaten to their utmost promote. The sacred attitude and legends credited through the deities care for a great numeral of inaccessible pockets. Tribal communities are our traditional natural legacy, which conserves the inhabitants of diverse species in its environment, which is the finest technique of protection. Conserving in addition to promoting the tradition are of imperative consequence to defend numerous widespread, in danger of extinction and relict natural species as glowing as to remain the environment protected designed for outlook generations. The current annotations reveled that the Northeast region is wealthy in wild plants having ethnobotanical worth. The medicinal plants participate a extremely very important part contained by the tribal culture of the Northeast region. The Conservation of ethnobotanical property and wild relations of harvest plants is necessary predestined for prospect breeding progamme. The Research effort worn on the economically important plants worn by the northeast tribes has to persist therefore so as to these plants and their information concerning them can be conserved ahead of they are vanished for increasingly.

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FOREST GOVERNANCE IN DEMOCRACY: AN EVOLUTION TOWARDS DEVOLUTION

Bikash Rath

ABSTRACT

Forest management during the colonial period started with the exclusion of people. Gradually this exclusiveness in the name of scientific management led to conflicts of various kinds, and both parties (the Forest Department and the communities) saw each other as opponents. The result was not good both ecologically and socio-economically. While the Departmental overworking degraded many valuable forests, communities also took advantage when the Departmental control was lax. However, in some cases communities started protecting forests on their own when realizing that they would be in trouble otherwise. This community forest management (CFM) was partly recognized by the government through the joint forest management (JFM) system. However, progressive laws such as PESA Act and FRA conferred greater rights to the local communities than allowed under JFM. While it was supposed to be an obligation on the part of the Forest Department to follow the spirit of these two laws, in practice it did not find that comfortable. The conflict of interest between the two sides should be resolved as soon as possible so as to ensure effective and low-cost conservation of our precious forest resources before it is too late.

Introduction:

When forests dominated and human population was still in its infancy, it was but natural to clear forests for the expansion of civilization. Rulers encouraged residents to expand agriculture by reclaiming forest land as paddy was then the principal source of revenue. However, during the 19th century when the ecological importance of forests was scientifically established and forest products assumed great market value, the colonial administration in India took steps to restrict forest areas for necessary conservation and management including scientific working. The initial idea was reserve those forest areas which were far from the human settlements (Rath, 2000). But in practice reserve lines were drawn near or through some human settlements. Forest rights were either not so properly recorded or settled, particularly in feudal areas where the rulers hardly recognized any resource rights of the people and considered their self-interest to be the utmost (Rath, 2005). The resentment resulting out of this, particularly with the growth of population, caused violent conflicts towards the end of 1930s and also in early 1940s, known as the Prajamandal Movements (Rath, 2000). The bloody conflict led to some relaxation in the forest rules, but an important outcome was drafting (by the British) a special forest policy for the Eastern States in 1942 which advised for a panchayat management of village forests in feasible areas (Rath, 2000). After independence, the princely states merged with India and subsequently the estates (zamindaries) were abolished. All reserved forests of the princely states, most of which were supposed to have been but arbitrarily notified without proper settlement of rights, were however given legal sanction by the Indian government through a special amendment in the Indian Forest Act (IFA), 1927 because except but few these feudal forests were not reserved under the IFA. As the result of this amendment the reserved

forests of the merged states became Reserve Forests whereas all other forests became Protected Forests. A separate category of forest, i.e. the village forest, was no more separately recognized as the third category; rather the IFA provided for notification of some areas of Reserve Forests as village forests implying therefore it to be an undercategory. The legal implication of this non-recognition to the village forest was significant as the village communities could not find exclusive forest tenure for their easy access and use.

However, a considerable forest area was under the control of the Revenue Department when the zamindaries were abolished and their land(including forest land) went to this Department. As its approach was significantly different from that of the Forest Department, the Revenue Department hardly bothered for protection & conservation of these forest areas and was liberal enough in allowing such areas for non-forest use. This caused degradation of some valuable forest areas.

By 1970s, forest degradation in parts of Odisha had forced some sensitive local communities to start protection of the patches under their immediate access. This protection was rendered irrespective of the legal status of the forest land, and the community sense of 'our forest' prevailed there, be it a Reserve Forest or a revenue forest. While the forests gained from it, conflicts were obvious when commercial working of the forest was attempted. The communities wanted to assert their rights over the major harvest of timber as they rendered protection to the forest, but the legal owners(Forest Department/Revenue Department) could not easily allow that. An easy way to manage the situation was the Forest Department would not issue transit permit thereby asserting that if its ownership is not recognized then it will not legally allow the extraction, whereas the concerned communities would try to sell out the harvest within the village itself or at best in the neighbouring villages where the transportation could be managed without transit permit.

In 1980s, the Social Forestry project was implemented in the country under which plantations were raised in village commons and private lands for meeting the fuelwood and other timber needs of the people. Village-level committees were constituted to manage these plantations. But these were not 'forests', rather monocultures of Eucalyptus or plantations of fast growing species which the communities did not value much.

In 1988, the Odisha government invited for community participation in the protection and management of Reserve Forests. In 1990, the provision was extended to Protected Forests also (Rath, 2002). In the same year, the Government of India issued a circular that facilitated launch of the JFM programme (Murali, et al. quoted in Siripurapu, 2013) in many states. The Odisha government notified its JFM resolution in 1993 whereby the village committees participating in forest protection under the government programme were now given more rights and their status was raised a little under a new name Vana Samrakshyan Samiti (VSS). Civil society enquiry however found out that many such committees actually existed in pen & paper only as they were claimed to have been created so as to meet the targets(Rath, 2002). This meant that the number of village communities claimed to be participating in the JFM programme was much less at ground level.

The colonial administrators had notified Excluded Areas and Partially Excluded Areas so as to provide some political immunity to the tribal areas. The word 'excluded' implied that such areas would be out of the purview of the laws that were normally applicable to other parts of the country. Governors were empowered to decide which laws would be applicable to the tribal areas and under what modification. The objective was not to interfere too much with the indigenous system of tribal administration so as to avoid conflicts. These areas were recognized as Schedule VI (otherwise known as Tribal Areas) and Schedule V (otherwise known as Schedule Areas) after independence (Rath, 2013). The immunity provided to the Schedule V areas was however less than that for Schedule VI areas.

In 1996, the Panchayats Extension to Schedule Areas Act or PESA Act was promulgated under which the 3-tier panchayati raj system was extended to such areas with some special provisions keeping the tribal culture and practices in view. However, in practice the Schedule Areas continued to be more or less the same in their administration and management as in the other areas because the government was not sincere enough to implement the special provisions except but few. This insincerity and laxity is recognized to be one of the major factors behind the rise of left wing extremism in these areas (Secretary, Ministry of Panchayati Raj quoted in Rath, 2013).

The historical injustice done to the forest dwellers was tried to be undone through the enactment of the Scheduled Tribe and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 popularly known as FRA. In 2012 however the Ministry of Tribal Affairs issued a comprehensive guideline with a statement that forest rights were still being ignored by the states, particularly when it comes to unhindered rights over minor forest produce (MFP) and entitlements over community forest resources (CFR). While individual entitlements were granted to many people, CFRs were granted only in few cases. The Ministry took this matter seriously and immediately after issuing the guidelines also amended the Forest Rights Rules so as to enforce the guidelines effectively.

India promulgated the Biological Diversity Act in 2002 chiefly to comply with its international commitment. This Act provided for constitution of Biodiversity Management Committees (BMCs) in the local bodies both in urban and rural areas.

The Wildlife Protection Act, 1972 was amended in 2002 to have two new Protected Area tenures: community reserve and conservation reserve. Community reserves correspond to lands under community/private ownership where wildlife protection is done by the communities, whereas conservation reserve corresponds to community wildlife protection on government lands outside sanctuaries and National Parks.

This way a number of legal provisions have tried to incorporate the scope for a community stake that varies from ownership to partnership, and from governance to management. However, a full-fledged community governance has hardly been possible under the existing regimes because of some inherent flaws.

1. Means and materials:

This appraisal is primarily based on the author's own research in the history of forest management systems in Odisha, alongwith some other primary studies and observations. Secondary references have been used but to enrich and substantiate the primary observations.

2. Key findings:

If forest administration was evolved towards devolution then that is not because of the foresters themselves but the political actors and administrators. This is partly because the political administrator has to have a comprehensive outlook and understanding with consideration of the political repercussions of the practices, whereas foresters may confine their focus primarily to forest conservation and management with a primary concern for their own stake(professional/academic) and but a secondary concern for the community rights. That IFS officers are normally accountable to IAS authorities and not the vice versa is a colonial practice conforming to this reality.

However, when it comes to political intermediaries the case may not be so simple. This is because either the intermediary may not see reason to be that much comprehensive in his/her outlook like the ultimate authority, or may have a stake almost similar to that of the foresters. The best example of this is the fact that while the British administrators of India had to adhere to the principles of democracy, the intermediaries such as the feudal rulers practiced autocracy and managed their states/zamindaries primarily for their own individual stake. Forest revenue was crucial to these feudal territories, and forest management was aimed at sustaining and maximizing this revenue. It is for this reason that when the British government advised the rulers for devolution of power in forest management (panchayat management of village forests), most of the latter either ignored it or took steps only in the namesake. It is interesting to note that similar conflict of interest was experienced between the ruling chief and the chieftain under him enjoying some political immunity and semi-sovereign status (Rath, 2000).

After independence the complications with intermediaries assumed a democratic difference when forest became a concurrent subject between the state and the centre. The states enacted their own state-specific forest laws broadly following the central law(s), particularly the Indian Forest Act, 1927 though in some cases the central law was followed directly(like the Wildlife Protection Act, 1972).The major impact of this concurrency was in the NTFP(non-timber forest produce) management. However, in the sixth Schedule Areas secondary intermediaries were recognized. The Autonomous District Councils of such areas enjoyed the right to manage the forest resources, a political arrangement that was in vogue even during the British period. Such a right helped for pursuing India's first REDD+ project in the state of Meghalaya. But at some point the stake of a third party continued to be recognized in one way or the other which is why despite ownership the local communities or their elected councils could not enjoy full and unhindered rights in their forests. Village communities in this state were found to be losing interest in their forests after

restrictions were imposed by the state as well as the district councils to regulate the commercial exploitation of the forests (Kumar, undated).

The JFM policy recognized in principle the local communities as partners in forest conservation and management, but in practice it was not so humble an approach which is why mature communities did not find it quite encouraging. The Forest Department continued to be the decision maker, and the villagers' were to work as per the norms imposed by the Department. It is for this reason in some cases the concerned communities practised JFM more for a namesake and actually continued a system independent of the Department. If many of them did not withdraw from JFM then that was partly because there was money in the programme, and the Forest Development Agency pumped this money for some village development activities which the communities found useful. A secondary factor that is supposed to have also influenced them is that unlike in pure CFM, the JFM recognized the stake of the communities even in the Reserve Forests though to a limited extent of area.

The Panchayats Extension to Scheduled Areas Act, 1996 provided for the rights of the Gram sabha in the fifth Scheduled Areas of the country to 'safeguard' and 'preserve' the community resources. This implied that the Gram sabha would be competent for protecting and preserving the local forests which the community considered as a community asset. However, it did not speak of two other important scopes: 'management' and 'development' (Bag, 2012). Nor did it say that there would be full ownership over the community resources except for the Minor Forest Produce. This indirectly meant that there would/could be a joint stake in the community resources including forests, particularly where a part of the resource (be it land or the trees) is owned by the government and is not in the name of the community. This limitation helped many state governments define the term 'Minor Forest Produce' in their own ways, and in Odisha particularly the government considered only 69 NTFPs as MFPs, the rest being still under government control. The result: although lac is an NTFP which the farmers in the Kuliposh area of Sundargarh district (Schedule Area) produce from their own trees in private lands, the Odisha government doesn't recognize it as a MFP, and hence the Forest Department has a transit restriction on this item without recognizing any power of the local Gram sabha or the Panchayat to issue a permit for the transportation of lac. This in fact suppressed the healthy growth of lac business in that area.

The Forest Rights Act is applicable to all forest lands of the country, be it a Schedule Area or not. In contrast, the PESA Act is applicable to both forest and non-forest resources including land, minor minerals, minor water bodies, etc.. But the advantage of FRA is that it ensured a tangible benefit at local level, particularly for the individual target beneficiaries which have not been possible under the PESA Act. However, FRA also doesn't recognize full ownership over the forests except for the MFPs which it has defined comprehensively including lac. Even this ownership has a limitation as it is applicable only for traditionally collected MFPs. However, FRA's recognition for community stake has been so strong that in critical wildlife habitats or for proposing a new Protected Area the settlement of forests rights is now essential which has not been a comfortable matter for the Forest Department which has been in practice of evacuating villages from the such wildlife habitats or Protected Areas. FRA

however has not just stopped with recognizing the authority of the local communities (forest right holders) in managing their forests, but has also mandated for protection and conservation of wildlife and biodiversity in this community management which is how the devolution has assumed a meaningful and comprehensive form.

The Biological Diversity Act has devolved the power of biodiversity management to local bodies, but it has not gone beyond that; i.e. upto the village level. Further, the arrangement is such that although the local bodies are supposed to manage the biological resources under their jurisdiction, the actual control lies with the State Biodiversity Board which happens to be the real decision making authority. Moreover, the functions of local BMCs are quite limited and not comprehensive. There is a concern that while the local bodies have their Standing Committees normally defunct, how come they are expected to successfully manage another committee(BMC) without adequate complimentary arrangements?

The amendment in Wildlife Protection Act in 2002 to incorporate community wildlife management areas is yet to attract much the communities and their civil society supporters because the norms appear to be not so community-friendly. The communities would be required to adhere to certain norms imposed by the government in addition to their own system of wildlife protection, and these norms mean some additional restrictions.

Under pressure from civil society organizations the Government of Odisha ultimately revised the JFM policy in 2011 so as to honour the spirit and mandate of PESA and FRA, and instead of the local forester as the Secretary of the VSS an elected representative of the community is now to hold the post. This progressive step was possible thanks to the efforts of the pro-people approach of the then Principal Secretary of the Forest & Environment Department, but the Department itself did not like to implement it immediately and to reconstitute the VSSs. The reason is obvious: reconstitution as per the new resolution would mean a loss of power.

There are several other regimes that are contradictory to the spirit of PESA Act and FRA, and are yet to be adequately amended. But the very sincerity of the political masters to ensure a proper and effective devolution is questionable because whatever they have done so far suggests a critical lack of coherence between functions, funds and functionaries. If there are functions devolved then either without sufficient funds or without adequate functionaries. This is how the comprehensive approach to devolution as per the 73rd and 74th Constitutional Amendment has not materialized properly in our country.

Sometimes the limitations of the communities are also known to hinder the success of devolution. The limitations may either be in the approach or in the capacity or otherwise. For instance, while endorsing the legal provision for community ownership over MFPs including kendu leaf, some communities however clearly admitted that the present situation doesn't favour kendu leaf management by the Gram sabha or the panchayat as that would make things precarious and critical for the community stakeholders (Bag, 2012). They have in fact favoured the presently pursued centralised system but with the modification that the State should do this not as a

monopoly right but on behalf of the communities themselves. Similarly, the failure some experiments of transferring forest areas to communities for management in the erstwhile Madras Presidency made the Forest Enquiry Committee of the Government of Odisha a bit sceptical of community management of forests (Government of Orissa, 1959), though this was in 1950s.

3. Suggestion for corrective measures:

A uniform and comprehensive policy on natural resource management with dignified participation of the local communities must be adopted under which necessary amendments to all relevant laws be made so as to bring coherence. Concurrency in power sharing should not be allowed to create chaos and contradictions in regimes and implementations. On the other hand, civil societies should also recognize the limitations of the local communities and facilitate necessary orientation and capacity building for them so that they can they can deserve devolution not only because of a constitutional mandate but also because of their potential and efficiency.

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IMPLEMENTATION AND OUTCOME OF FOREST RIGHTS ACT 2006: EVIDENCE FROM TWO INDIAN STATES

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ABSTRACT

Historically forest dwelling populations in India have been subjected to a range of forest rights deprivations that have affected their livelihood adversely. Due to continuous and concerted efforts by progressive political groups, civil society organisations and intellectuals, the historic Forest Rights Act was passed in 2006. The implementation process started in majority of the Indian states since 2008 including in Odisha and Jharkhand. The process in both the states is not smooth and the progress has been tardy due to number of factors. Proper implementation of this Act will have a significant impact on the livelihood of the potential beneficiaries and also on the growth of forests. The provision of inalienable land titles will reduce the tenure insecurity. This will also provide incentives to the households for improvement and development of the land under their possession and thereby strengthen their livelihood. This in turn, will reduce the excessive dependence on the forest resources. The present paper seeks to analyse the actual process of implementation at different institutional levels, factors that constrain its proper implementation and to understand its outcome in the context of Odisha and Jharkhand.

(Key Words: Community, Forest Rights Act, Land, Livelihood, Tribal)

Introduction

The forest dwellers in general and the Scheduled Tribes in particular are the most disadvantaged in respect to land, which largely accounts for their perpetual poverty and makes them vulnerable to injustice and exploitation. There are a large number of processes through which tribal have lost their access to land and forests essential for their survival and livelihoods in India. These not only include alienation of land which is legally owned by the tribal through debt mortgaging and sale, but also loss of access to land through reservation of forests, loss of traditional shifting cultivation land through survey and settlement, displacement, unsuitable and unimplemented land reform law etc. Over a period of time, all these processes have led to loss of control and access to livelihood support systems vital to existence, marginalising and destitution of tribal communities. Influx of non-tribal since the last two centuries, many of whom are more capable of negotiating state enforced legal and tenure systems, have pushed tribal communities to the bottom of the local power hierarchies, even in areas where they are in majorities. In area where tribal are in minorities, their conditions, along with that of Scheduled Caste (SC) or *dalits*, are even more miserable and powerless. Lack of ownership and claim over land and other factors of production is one of the fundamental reasons behind the deprivation of rights of the tribal in India.

More recently, the Indian government has legislated to acknowledge the “rights” of Scheduled Tribe areas by taking them further towards self-rule. In 1996, the Indian Parliament passed the Panchayat Extension to the Scheduled Areas Act (PESA), 1996. The Act covers nine Schedule V states of Andhra Pradesh, Chhattisgarh, Gujarat,

Himachal Pradesh, Jharkhand, Madhya Pradesh, Maharashtra, Odisha and Rajasthan and instead of individuals, recognises and stresses on traditional community rights over natural resources. The recent Forest Rights Act or the Tribal Rights Act is a step further as they adopt a rights-based perspective and acknowledge the pre-eminent rights of STs to natural resources.

The basic proposition that scheduled tribes and other forest dependent communities are the most disadvantaged in respect to land, which largely accounts for their perpetual poverty and makes them vulnerable to injustice and exploitation. However attempts have been made by the union and state government to promote and protect their rights with regard to the control and use of forest land. The nature of legislative measures and their implementation such as the Forest Right Act 2006 and their achievements are likely to vary from state to state. This variation is due to the influence of the complex interaction of historical necessities and socio-political and economic forces which are largely state or region specific. In such a context, a comprehensive and comparative study of the working of the forest right act and their impact on livelihood will be helpful in understanding the situations at the grassroots level.

The emergence of the Act highlights both the pressures for and the obstacles that were faced in its making. One of the consequences of the disagreements was the delay in the finalisation and notification of the Act. The Bill which was drafted on 13th December 2005 was tabled in the parliament on 18th December 2006 and was finally notified on 1st January 2008. Moreover, the rules that were notified are truncated, taking away the spirit of the Act in many ways. The Act was unique in several ways such as: it covered both agricultural land and forest lands including National Parks and Wildlife Sanctuaries, provided both individual and community tenure, combined rights and responsibilities, provided key role to *Gram Sabha*. There is enormous challenge in implementation of this Act which seeks to create a new democratic system of forest governance by redistributing power between the communities and bureaucracy.

Evolution of Forest Policies in India

From about the middle of the 19th century, people from outside began to move into the forest, lured by its wealth of natural resources, and the colonial government, sensing the commercial potential of forests, gradually extended its authority over them in the name of scientific management. In view of the above a brief illustration of the evolution of forest policy in India during the pre and post colonial period is discussed below:

Pre Independence period

Keeping in view the importance of natural resources and commercial significance of forest resource, certain regulations were formulated and implemented during the colonial administration to appropriate revenue benefits from the forest based resources. The beginning of a forest policy in the pre-independence India started in 1855 when the then Governor General, Lord Dalhousie, issued a memorandum on forest conservation restricting the customary rights of the forest dwellers on the use of forest resources through a ban on their movement in the forest. Further, the Indian

Forest Act (IFA) 1865 empowered the government to declare authority on such resources for national interests. It was noticed that for all purposes the state seems to have played a dominant role over the right of the individuals and communities. Later during 1878 the Indian forest Act classified all forests of India into three categories, i.e., *reserve forest*, *protected forest* and *village forest* keeping in view the national forest policy. The first ever forest policy came into existence in 1894. The primary objectives for maintenance of adequate forest cover to assume preservation of climate, physical conditions of the forest was emphasised. Therefore, the policy regulated the rights and put restriction on privileges previously enjoyed by the local inhabitants. Since then this has banned shifting cultivation and protected hill slopes resulting in conflicting situation for the forest dwellers with the forest department.

The Indian Forest Act 1927 and Government of India Act 1935 consolidated the power of the Government on forest, emphasised on the revenue yield aspects and resource requirement of British industry, commerce and military sectors. As a result, forest as an area of revenue yielding was included in the state list.

Post Independence Period

The forestry policies during post-independent India include: National Forest Policy, 1952; the National Commission on Agriculture (NCA), 1976; Forest Conservation Act 1980; and the National Forest Policy, 1988. The national forest policy formulated during 1952 mainly focused on forest as the source of timber but neglected the village commons. The state restricted the common people to have agricultural operations within forest land and also in the periphery areas of reserved forest. The free grazing of forest and free enjoyment of private forests were controlled whereas tribal people were denied from practicing shifting cultivation. Due to the abolition of *Zamindari system* in 1952, the government took over the management of forests and formulated a number of legislations to reduce freedom of tribal over the use of forest and its resources. Apart from this, cultivation, hunting and fishing were also prohibited inside the reserved and protected forests. These measures increased the deprivation of people from forest resources while assuming greater use of forest produce` by the neighbouring communities. The emphasis was laid more on national interest, often, interpreted as commercial interest.

Subsequently, during 1976 the Government of India formulated the National Commission on Agriculture and the Social Forestry was recommended for creation of Forest Corporation to improve the commercial feasibility. According to the recommendations, many conservation oriented production forestry programmes were implemented and suggested with detailed modalities to yield successful results. Apart from the special interest for the benefit of tribal, special provisions (various wage earning avenues) and restrictions were made for their entry into forest. In addition to this, the culture, tradition and ethos of the forest dwellers were also not given proper attention by the commission. Again, no special programmes were implemented for enhancing the economy of the tribal. Instead, programmes were essentially drawn for developing forest resources benefiting tribal indirectly through wage earnings.

Deprivation of tribal along with degradation of forests influenced the policy makers to look forward to a new forest law that appeared later on as Forest Conservation Act 1980 by the Government of India (GoI), restricting the rights of the state Governments (Sarangi, 2003). However, the law expanded the definition of ‘non forest purposes’ which included the cultivation of cash crops like tea, coffee, spices, rubber plants, oil bearing plants, horticultural crops and medicinal plants. This new bill initiated a debate with respect to policies, legislations and also on the role of different stakeholders such as activists, scientists, forest department contractors and industrialists (Sarangi, 2008). Consequently, it resulted in creating a Forest department by separating it from Agriculture department and named it as Ministry of Environment and Forest (MoEF). The new department deals with forest issues with a kind of pragmatic approach, so that the forest related issues, both for the benefit of government and people, could be dealt with properly. Accordingly various forest issues and related matters concerning people participation, forest revenue, deforestation, ecology, etc., could be taken care of by this ministry as and when necessary.

Table 1: Phases of Forest Governance during Post Independence Period

| Phases | Major Policies | Highlight Points |
|-------------------------------|---|---|
| Phase- I 1947-1970 | National Forest Policy (1952) | ✓ Commercial Exploitation of Forest for Industrial Development. |
| Phase- II 1971- 1988 | National Commission on Agriculture (1976); Forest Conservation Act (1980) | ✓ Conservation through powerful legislation such as Wildlife Conservation Act & Forest Conservation Act. ✓ No Place for Forest Dwellers and Tribal in protection and management of local forest resources. |
| Phase- III 1988 Onwards | National Forest Policy (1988) | Based on three major components: ✓ Emphasis on Participation of forest dwellers. ✓ Increasing access to forest products. ✓ Enhancing Livelihoods. |

National Forest Policy, 1988: A Paradigm Shift

Even after the adoption of the new Policy, the Indian Forest Act 1927 with several amendments continued till the National Forest Policy (1988) came up, with the primary objective of maintenance of environmental stability, meeting the requirement of fuel wood, fodder, etc., of the rural and tribal population and creation of massive support to ensure minimal pressure on existing forests. A wide discussion at national and international level forums suggested various ways and means to formulate a Package of programmes to ensure sustainable forest development and ensuring livelihood of forest dependent population. Similarly, there was a lot of criticism of many provisions of the Forest Conservation Act 1980. These provided inputs to the government of India’s National Forest Policy, 1988 which modified a number of provisions of earlier acts for the benefit of the poor. For the first time recognition of non-market and ecological benefits was emphasised in the Seventh Plan Document (1985–90). It was made clear that raw materials for forest based industries would be

provided only after meeting the needs of the local people. The Central Board of Forestry recommended a ban on commercial exploitation of degraded forests and regeneration of national forest, in order to reduce the growing pressure on forest resources.

Thus, the new forest Policy seems to have planned for protection, conservation and management of the forest and its resources. It also honoured the customary rights of the people; replaced the contractors with tribal co-operatives, co-operative government undertakings and corporations; it suggested suitable alternatives for shifting cultivators such as engagement of these people in forest based industries. With the adoption of National Forest Policy 1988, the colonial forest Policy establishing straight control over forest by the Forest Department was weakened (Sarangi, 2007). However, rules to implement the policy were not put in place until much later, and state governments in the meantime progressively reduced the traditional rights of the tribal people.

The question of forest rights is related to the modern concept of ownership, but notions of the forest people in this regard are quite different. The forest is the pivot around which the tribal life revolves, but for the state, the forest is simply a source of raw materials for industry and revenue for itself. In majority of the states in India, the Forest Department is a major source of revenue for the government. It is no wonder that successive plans, policies, and legislation have resulted in restricting the rights and usage of forests by millions of tribal people for whom forests are their only refuge and source of sustenance.

In the late 20th century, particularly after the United Nations drew up international environmental principles in the 1972 Stockholm Declaration and the 1992 Rio Declaration, the Government of India progressively introduced different policies and laws that paved the way to recognize that tribal peoples, especially forest dwellers, had rights over ancestral land, including the right to earn their livelihood from forests and maintain a cultural identity that is linked to them. After nearly 25 years of debate and extensive consultations, this process culminated in the enactment of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006 (Government of India, 2007). This legislation, known as the FRA, is a landmark in the evolution of the government's attitudes on tribal people and their rights. It attempts not only to correct a "historic injustice" committed by the colonial and postcolonial rulers but also to vest in forest communities a primary role in sustaining forest ecosystems by restoring their rights as well as their environmental duties. It became active on 31st December 2007, and its implementing rules were issued on 1st January 2008. The law basically grants legal recognition to the rights of traditional forest-dwelling communities, partially correcting the injustice caused by successive forest laws in the 19th and 20th centuries, and it makes a beginning toward giving those communities and the public a voice in forest and wildlife conservation. However the preamble to the FRA states that it is "*an Act to recognise and vest the forest rights and occupation in forest land in forest dwelling Scheduled Tribes and other forest dwellers who have been residing in such forests for generations but whose rights could not be recorded; and to provide for a framework for recording the forest rights so vested and the nature of evidence required for such recognition and vesting in respect of forest land*".

Research Problem

In the absence of adequate resource endowment such as land, human capital and access to service sector, forest play a crucial role in the livelihood strategies of many rural household in Odisha (Sarap & Sarangi, 2009, 2010a). The situation is almost similar in case of Jharkhand. However, the multifaceted deprivations faced by the tribal and other forest dwellers have led to loss of private land, forest land and forest products to these communities. It has severely restricted their access to these sources of livelihoods. Similarly the people living in un-surveyed areas, and forest villages were also deprived access to any sort of service provisions provided by the state. As a result their level of living is at rock bottom. Large scale displacement of tribal on account of development projects including mining activities further eroded their livelihood options. In order to survive they had to borrow loan from the moneylenders at exorbitant rate of interest by mortgaging their tiny pieces of private land which they could not recover due to lack of funds or malpractices adopted by the moneylenders. Thus cultivable land held under private ownership was lost due to indebtedness in many parts of these states (Sarap & Sarangi 2010b).

The access to land especially the average size and quality of land available to the tribal in the scheduled areas of Odisha & Jharkhand is very low. Clearly the tribal of these states were characterised by landlessness and small holdings – which resulted into low level of crop output and income. In such a situation the dependency of the tribal on forest would be high. But due to loss of forest land and forest they have to foray into further deep into the forest or work as uncertain wage labour. Moreover, majority of the tribal workers are agricultural labourers and marginal farmers. Deforestation has a particularly negative impact on women as collection of NTFPs has been their primary occupation and access to resources outside these areas is not ensured. Several decades of special development efforts by these states (particularly in Odisha) through Tribal Development Plans has not resulted improvement of their livelihood. Similarly more than a decade old state like Jharkhand also the Tribal Development programmes has not improved much the livelihood condition of majority of the tribal.

Research Questions, Objective and Methodology

In view of the above research problems and literature survey the current paper raise the following research questions: What process has been adopted to implement forest right act (FRA) in both the states? And what are the practical difficulties faced by different institutions at various level? What are the outcomes under FRA implementation in both the states? Based on the secondary sources like historical records, government document, NGO reports and Media reports etc. The present paper tries to understand the actual process of FRA Implementation and the practical difficulties associated in implementation at various institutional levels in the state of Odisha and Jharkhand. These two states were selected for the analysis because of the high concentration of ST population and high dependence on forest resources for livelihoods.

Socio-economic background of Odisha and Jharkhand

The state of Odisha is situated on the eastern coast of India, covering an area of 155,707 sq. kms. The state is divided into 30 administrative districts and 314 blocks. About 85 per cent of the people in Odisha live in rural areas. According to the 2001 census of India, scheduled castes (SCs) and scheduled tribes (STs) constitute 39% of the total population of the state. Some of the important tribes are Santhal, Bonda, Munda, Oraon, Kora and Mahali. In the overall poverty ranking of states in India, Odisha ranks 27 out of 30. The state of Odisha's actual forest coverage is about 31 percent of its geographical area. There are two national parks, two tiger reserves, one biosphere reserve, and 18 wildlife sanctuaries, covering 5 percent of Odisha's geographical area. The state is home to 62 types of tribes, 13 of which are categorised as particularly vulnerable tribal groups (PTGs). Out of nearly 47, 000 villages, there are about 29,300 forest fringe villages with a forest area of about 1,780 000 ha and population of nearly 15,935,0009. The forested districts are homeland to the tribes and PTGs and the forest cover in 12 tribal districts is about 38 percent of their total geographical area. One-third of Odisha's population depends on forests, which provide livelihood and food security for 4 to 6 months per year and contribute 20 to 50 percent to annual household income. Similarly the state of Jharkhand is situated in eastern India and it is a new state carved out of Bihar in 2000 and covering an area of 79,714 sq. kms. The state is divided into 24 administrative districts and 211 blocks. About 75.9% of the people in Jharkhand live in rural areas. According to the census of India 2001, people belonging to scheduled castes (SCs) and scheduled tribes (STs) constitute 38% of the total population of the state. Some of the important tribes are Santhal, Oraon, Munda, Ho and Kharia. In the overall poverty ranking of states in India, Jharkhand ranks 29 out of 30. In both the states the level of living and Human Development Index is very low (see table-2 below).

Table 2: Socio Economic condition of Scheduled Tribes in Odisha and Jharkhand

| Indicators | Odisha | Jharkhand |
|---|--|--|
| Percentage of ST population | 22.13 | 26.30 |
| Rank in terms of ST population | 3 rd | 6 th |
| Percentage of Scheduled area to the total geographical area | 44.7 | 29.0 |
| Number of Tribal Communities | 62 | 32 |
| Number of Primitive Tribal Groups (PTGs) | 13 | 08 |
| Percentage of ST population below poverty line (BPL) | 75.6 | 54.2 |
| Percentage of Literacy among ST | Overall- 37.37 Female- 23.37 | Overall- 40.70 Female- 27.2 |
| Workforce participation of ST | Main workers- 57.4%, Marginal workers- 42.6%, Cultivators- 33.35 | Main workers- 59.4%, Agriculture Labour- 31.0%, Cultivators- More then 50% |
| Concentration | 12 districts (non-costal) of southern and western part of Odisha | All most in all districts |
| HDI Index (2011) | 0.362 | 0.376 |
| Rank In terms of HDI Index | 15 th | 19 th |

Source: Compiled by the author from various government's reports.

Emergence of Forest Rights Act 2006: A new hope for Tribal and Forest dwellers

In 2006, as a result of a long campaign by forest rights activists, the Government of India enacted a new act entitled “The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006”. Those in support of the act regard it as the long overdue recognition of the rights of scheduled tribes and forest dwellers to the lands they have occupied for centuries. It will save them from being treated as encroachers and evicted for development purposes without compensation, as has often happened in the past. It is also contended by the tribal rights activists that secure tenurial rights will lead to sustainable management of land. Those who are opposed to the act fear that it will undermine the fast-dwindling forests and sound the death knell for the endangered tiger population.

Box 1: Provision of Rights under FRA 2006

The FRA lists the following as forest dwellers’ rights:

- Right to hold and live on forest land as an individual or community and to cultivate land as a livelihood
- Community rights such as cattle grazing on forest land
- Right to collect, own, use, and dispose of minor forest produce that has been traditionally collected within or outside village boundaries by forest dwellers
- Community rights to fish and collect other products from water bodies
- Right to use traditional seasonal resources such as pastures and water bodies as nomadic or pastoralist communities
- Community rights including tenures of habitat for primitive tribal and pre-agricultural groups
- Right to reclaim any disputed land over which forest dwellers had user rights
- Rights for converting to titles leases or grants of forest lands issued by local authorities or state government
- Rights of settlement and conservation of all forest villages, old habitation, un-surveyed villages and villages in forests
- Right to protect, regenerate, conserve, or manage any community forest resource that the community has traditionally protected and conserved for sustainable use Rights that are recognised under state law or laws of any autonomous district or regional council or rights that are accepted as rights of tribal people under any traditional or customary law of the concerned tribes of any state
- Rights to claim intellectual property rights over traditional knowledge related to biodiversity and cultural diversity
- Any other traditional right enjoyed by the forest-dwelling scheduled tribes or other traditional forest dwellers, but excluding the traditional right of hunting or trapping of animals
- Right to relocation and rehabilitation if evicted or displaced from forest land without providing legal entitlement to relocation or rehabilitation before 13 December 2005
- Right to use forest land not exceeding one hectare to build schools, dispensaries, fair-price shops, communication lines, minor irrigation canals or other water bodies, vocational training centres, roads, community centres, and drinking water supply pipelines, subject to approval by the *gram sabha* (village assembly)

Source: Rules of FRA 2006

The implementation of this law is not smooth in many states. Tribal and forest-dwelling people will not get the rights to forest land automatically. Only those families who have been primarily residing in forest areas for three generations (nearly 75 years) will be entitled. The verification procedures to determine eligibility are not simple and could be quite time consuming, as disputes may arise among the forest-dwelling communities themselves. The act also prevents the use of forest land for development purposes such as mining, reservoir construction, and industrial plants without the consent of the tribal people who live in forests or in the vicinity through *gram sabhas* (village assemblies). But there is a risk that politically connected commercial interests could manipulate *gram sabhas* to obtain such lands for commercial purposes. The tribal rights activists also warn against the machinations of some bureaucrats, especially those in the Forest Department who think that the department is the master of all forests in India. This could obstruct the implementation of the act and deny its benefits for tribal people. Implementing the act is going to get further complicated as the law confronts legal challenges? Some who are opposed to granting tribal peoples forest rights have already filed public interest litigation in the Madras (Madurai Branch) and Andhra Pradesh high courts (Ramakrishnan 2008). The contention of petitioners is that large-scale distribution of forest land will be against the national forest policy, as it will become difficult to keep at least one third of the total land area under forest cover. Sceptical that the promised benefits for forest dwellers will come to pass, Ramnath (2008) concludes that “it is difficult to imagine that so many advantages to tribal peoples will actually be implemented.”

The reference to “historical injustice” to forest dwellers during the colonial and postcolonial periods sends a powerful political message to all state governments in India. Its operational implication is that the new law cannot accomplish significant improvements in the status of forest dwellers unless a constructive political and administrative dialogue is continued at the state level to take urgent and comprehensive actions to implement it. Also needed is a campaign to raise public awareness. Indian society at large must see the validity of forest dwellers’ customary rights to earn their livelihood and sustain their cultural identities through the legally recognised relationship between them and their ancestral lands.

Box 2: Steps for FRA Implementation

The Act prescribes a number of sequential steps for the implementation of the provisions of the Act from *Gram Sabha* to state level committee. The following sequential steps are to be undertaken for smooth implementation of the Act.

- A meeting of the *Palli Sabha* is convened by the *Sarpanch* on the request and presence of representative of *Panchayat Samittee* of the concerned village/hamlet to elect Forest Rights Committee (FRC) composed of 10 to 15 persons including one third of women members. The role of FRC is to assist the *Gram Sabha* in its function to collate, verify and approve claims to rights.
- The FRC receives claim forms from individual and communities on behalf of the *Gram Sabha/Palli Sabha*. It has to provide reasonable time and opportunity to the claimants and others to prepare map demarcating area of each recommended claim as prescribed under the Act. The claim form is to be accompanied by at least two evidences (out of nine given in the Act) authenticating the claim. The *Gram Sabha* shall, then, pass a resolution on the claims submitted and to forward a copy of the same to the sub divisional level committee (SDLC). Any person aggrieved by the decision of the *Gram Sabha* may apply to the SDLC within sixty days from passing of resolution by the *Gram Sabha* for a decision on the petition.
- The SDLC consists of SDO, Tribal welfare officer, Forest range officer and three members of the *Panchayat Samittee* (PS) to be appointed by the PS. The SDLC examines the resolution/decision of the *Gram Sabha* and prepares the records of forest rights and forward it through the SDO to the district level committee for a final decision FN.
- The District Level Committee (DLC) composed of Collector, District Forest Officer (DFO), District Welfare Officer (in Odisha it is DRDA/ITDA) and three representatives of *Zilla Parisad* (ZP) to be appointed by ZP. The DLC is the final authority to decide and approve on the forms (both individual and community) prepared by the SDLC.
- The state level monitoring committee monitors about the progress of recognition and vetting of forest rights.

Source: Rules of Forest Rights Act 2006

Implementation and Outcome of FRA in Odisha

FRA is a new Act passed in 2006. Immediately afterwards, the implementation of the Act got locked in court cases. The Retired Foresters' Association filed cases in at least 10 States of India against its implementation, as they alleged, it encouraged illegal encroachment and led to disruption of the eco-system. Therefore, not many books or articles have been written on it. Only NGOs, CBOs engaged in the campaign for FRA have come up with quick surveys and impact assessment. Most of these Studies, not yet published, have been covered in the paper. One Study was done at the behest of the Ministry of Tribal Affairs by the Scheduled Castes and Scheduled Tribes Research and Training Institute (SCSTRTI), Bhubaneswar, Odisha. They identified the institutional and administrative bottlenecks in implementation of FRA and made recommendations

for redressal of such problems. Other Studies by NGOs like Skill Share International, Campaign for Survival and Dignity (CSD) and other tribal organisations related to the implementation difficulties. They argue that the MoEF set arbitrary deadlines, relocated people without approval, diverted land in the name of critical wildlife habitats. They also focused on lack of adequate awareness of the provisions of the Act.

There is a vast amount of literature on the forest policies in India – changing use and management of forests. It starts from the Indian Forest Act 1865. In Springate-Baginski and Blakie, 2007, the core theme has been how forest Act aimed at securing steady increase in timber production and silvi-cultural improvement. It was meant for construction of railways. So the colonial approach was “the starting point of State intrusion in to the complex customary rights and resource-use patterns then existing in India (Springate, 2007).

When the tribal and other forest dwellers suffered hardships and resisted, the Government of India introduced social forestry in its Fifth Five Year Plan. It aimed at helping forest dwellers to meet their needs of fodder, firewood and timber whilst reducing their dependence on forest lands. This was supported by SIDA and DFID among others as recorded by Hobley, 1992. Saxena and Ballabh (1995) evaluated the social forestry programmes and conclude how they failed. Poffenberger (1990) also joins in terming the social forestry as environmentally and socially undesirable. Sarin, et. al. (2007) captures the shift from State control or facilitation to participatory approaches and community management, enshrined in Joint Forest Management (JFM). Dharamadhikary (2008) deals with the latest trend of compliance of industrial needs by forest policies like mining and large hydroelectric projects.

In the state of Odisha the process of implementation of the Act started since January 2008. A number of agents are involved in the process. Four departments namely Tribal, Revenue, Forest and *Panchayati Raj* are working in coordination for implementing the Act, with the Tribal Welfare department being the nodal agency. Based on the Forest Rights Act 2006 the department of SC and ST Development Commission, Government of Odisha has written to all the collectors of the districts to form committees at district, sub-divisional and the village level through *Palli Sabha*¹ on 15 February 2008.

The *Panchayati Raj* department in consultation with other departments directed the official at district and block level to hold *Palli Sabha* on 16 and 23 March 2008 to form FRC at the village/hamlet level after giving proper orientation on the FRA and its Rules. The dates of holding *Palli Sabha* were published through local Medias. Official to be entrusted for implementation of FRA at different level were familiarised through discussion and training on the different provisions of the act. However, discrimination of different provision of law could not be widely given to the villagers due to shortage of time and officials and local level conversant with the act.

Initially FRC were formed only revenue villages and many forest villages, un-surveyed villages and forest habitations were excluded. Further *Gram Sabhas* could not be held in many villages due to lack of preparedness by the *panchayat* level authority,

¹ Village level assembly is known as *Palli Sabha* in Odisha.

lack of quorum and due to the confusion about the purposes for which the meeting was held at the village/ hamlet level. Even some *Gram Sabha* meeting were held after the fixed dates. The state further allowed convening FRC meeting by *Gram Sabha* in later period.

Continuous and wider interactions among the different stakeholders, including the implementing agencies and facilitating agents such as civil society organisation led to simplification in the understanding of different provision of the act among the local officials and potential beneficiaries.

The implementing departments facilitated the forest right committees in the preparation of the map relating to the land under possession by the potential beneficiaries, type of evidences in support of their claims. The civil society organisations played an important role in enabling the communities, protecting forest on the community basis, to submit claims to the implementing agencies.

However, it is to be stressed that given low level of literacy among the ST/SC and other backward caste households in general and rural areas in particular, all these efforts of awareness building had limited impact on the prospective claimants and FRC members² initially but later on it was picked up. Awareness campaigning was largely absent in the remote areas.

Even though the act has to be implemented within a time frame, most of the departments of the state have taken the task of implementation as one of the several functions it has to perform. Initially the attitude of the forest department has not been proactive given its control over the forest for over hundred years but later on this department has been a part of the process and co-operated in the implementation along with the other department. There was inadequate sanction of funds for hiring of technical personals (*patwaries* and other personal) for preparation of map for the claimants and verification of land records.

Due to legal and technical grounds on the control and management of land by both Revenue and Forest Department, only the maps for the lands occupied and cultivated within the revenue boundary has been prepared excluding the areas under Reserve Forest (RF), Protected Forest (PF), National parks, Sanctuaries, etc. This is only happening in case of the individual rights over forestland. However, the right over Community Forest (CF) was not getting much attention for long. The FRA has been largely considered as land rights over a piece of forestland negating the Community Forest Right (CFR) as the most important one. This has been a major gap in understanding FRA at government level as well as civil society. Besides, there are specific provisions for PTGs, pastoral and pre-agricultural nomadic communities displaced people under FRA, which has been a no starter. There has been complete lack of clarity at government and civil society level.

² Many claimants found difficult in getting caste certificate (for ST) as they have no *Patta* land but only customary rights on the land under their possession. Because of this there is confusion as to who will issue caste certificate. Because of this type of confusion many potential claimants could not submit the claim forms in time even though they have forest land under their possession.

Implementation and Outcome of FRA in Jharkhand

Implementation of the Act only began in Jharkhand in October 2008, due to the lack of elected *panchayats* in the State. The State government claimed that it was not able to implement the Act due to this, since the Act requires elected members in the Sub Divisional and District Level Committees, while the Rules require the *panchayats* to summon a *gram sabha*. The Ministry of Tribal Affairs was requested for a clarification on this and had, in July 2008, informed the Jharkhand government that the State government can, in consultation with the *gram sabhas*, appoint members to fill these positions. In Latehar, West Singhbhum and East Singhbhum districts, *gram sabhas* were called at the end of November 2008 and Forest Rights Committees elected, though in some areas the Forest Department has tried to impose JFM Committee members as FRC members. Initially during the year 2009, systematic distribution of claim forms had not yet taken place in most areas. Although District Collectors have received some funds for printing forms etc, even where printed the form the BDOs have not bothered to distribute them. There are reports of revenue field level officials demanding bribes for giving forms. The Forest Department has attempted to restrict recognition to pre-1980's claimants in some areas.

Table 3: Progress under FRA 2006: A Snapshot

| State | No. of claims received | No. of titles distributed | No. of claims rejected | Extend of forest land for which titles distributed (in acres) |
|---|--|--|--|---|
| Odisha | 5,32,464 (5,29,160 IFR & 3,304 CFR) | 3,01,200 (3,00,321 IFR & 879 CFR) (56.57%) | 1,31,970 (1,31,361 IFR & 609 CFR) (24.78%) | 5,39,277.45 (4,84,025.80 IFR & 55,251.65 CFR) |
| Jharkhand | 42,003 | 15,296 (36.42%) | 16,958 (40.37%) | 37,678.93 |
| All India level | 32,36,539 | 12,75,570 (39.41%) 14,603 (Ready for distribution) | 15,12,811 (46.74%) | 46,23,993.94 |
| Odisha Rank 3 rd and Jharkhand Rank 8 th in terms of percentage of titles distributed over number of claims received. (IFR- Individual, CFR- Community) | | | | |

Source: Government of India, Ministry of Tribal Affairs, (As on 31st December 2012)

Note: Figures in the brackets indicates percentage to the total claim received

Though hundreds of settlements submitted resolutions seeking constitution of hamlet level *gram sabhas*, initially most *gram sabhas* have taken place at the revenue village level. In Latehar, the Collector has agreed to hold *gram sabhas* as per the provisions of the *Panchayati Raj* Act of Jharkhand. The process of recognising hamlet level *gram sabhas* has begun in the district. In early 2009, there were also intensifying efforts to remove people from their lands for plantation purposes. In Latehar district, in the second week of February, false cases were filed against people who resisted plantations and two people were arrested. Even in August 2009, cases were filed against people occupying forest land since ages and they were jailed. Many villagers have been evicted since 2005 in the name of undertaking plantations.

As of October 2009, the State government had not issued any clear orders, and actual implementation was dependent on the District Collectors. In the absence of clear procedural guidelines being issued across the state, and the limited personnel available with the welfare department, implementation is largely being led by the district collectors. There seems to be wide variation in the approach being followed by different collectors. In some districts, the Collectors have delegated the task of getting FRCs elected to poorly trained BDOs. In some areas the BDOs have nominated FRC members on their own without calling *gram sabha* meetings while in other cases, the Collector is insisting on seeing the signatures of 2/3rd members of the *Gram Sabha* on the voters' list before accepting the validity of the *gram sabha* meeting. Largely due to state government pressure to show some results, about 2000 individual titles have been issued in the whole state to date. In many cases the titles are for lesser area than that claimed but no reasons have been given for the same. The claims of other traditional forest dwellers are being ignored. There have reportedly been almost no claims for community forest rights, in one area, the Birhors claimed the right to collect NTFPs which has been granted over a 150 acre forest area. The Forest Department is refusing to accept claims in most wildlife sanctuaries, national parks and tiger reserves on the grounds that rights in reserve forests were recognised during the colonial period. However, some individual land titles have been issued in Hazaribagh wildlife sanctuary. No effort has been made to convert forest villages (there are 28 forest villages in the state) into revenue villages although individual titles have been issued in one. Bamboo and Tendu leaf continue being managed as nationalised MFPs by the forest department.

Jharkhand is an important state for FRA implementation, with a large forest area and a very large tribal and non-tribal forest-dependent population. However, by 31st December 2012, the number of individual claims received in Jharkhand was only 42,003 and of these, only 15,296 had been granted, which makes it less than one claim per forest dependent village. This is a surprisingly low figure, and a cause for concern about the manner of implementation. Moreover, very few claims for Community Forest Rights have been received; those listed as CFR claims are mostly for diversion to non-forest activities or minor claims for graveyards and threshing grounds. The main objective of giving community rights to forest resources has not been achieved. The reasons for this situation include:

1. A number of prima facie deserving claimants appear to be left out of the process entirely, due to lack of awareness and information, non-supply of forms, etc.
2. Rejections are often happening on faulty interpretation of the Act.
3. A number of cases of inordinate delays in processing claims, in providing support to *Gram Sabhas* to process claims, and prima facie tenable allegations of corruption by frontline staff and village leaders have emerged.
4. Several cases of Forest department illegally initiating plantation activities in land for which cultivation claims have been filed (or could be filed) are occurring
5. Several deviations have occurred from the process of implementation laid down in the law, including no real involvement of the *Gram Sabha*, wrong attribution of rejection made by officials to the *Gram Sabha*, no communication of rejection to the claimants, etc.

6. Where claims have been granted, the process of mutation of land records is incomplete and in the case of community claims, the titles issued are faulty.
7. Several communities believe that applying under the Act will weaken their claim for full forest rights as per earlier Acts, for which they have been agitating for a long time.

The main underlying reason for this state of affairs appears to be a lack of interest in the state government towards implementation of the Act, and the consequent inadequate realisation of the potential of the Act to reduce land right conflicts and empower tribal and forest dependent communities. In spite of resources being available, on the ground implementation is poor, misdirected, with inadequate staffing, poor understanding of CFR provisions, and willingness to take the easy route by asking the Forest Department to play the major role.

The position in regard to the progress of implementation of the FRA at different institutional levels in Odisha and Jharkhand up to 31st December 2012 is given in the table 4 below:

Table 4: Progress and Distribution of individual and community claims under FRA upto 31st December 2012

| Particulars | | Status | States | |
|-------------|---|------------|-------------|-----------|
| | | | Odisha | Jharkhand |
| 1 | Number of claims filed at Gram Sabha level* | Total | 5,32,464 | 42,003 |
| | | Individual | 5,29,160 | NA |
| | | Community | 3,304 | NA |
| 2 | Number of claims recommended by Gram Sabha to SDLC | Total | 4,12,458 | 23,617 |
| | | Individual | 4,11,008 | NA |
| | | Community | 1,450 | NA |
| 3 | Number of claims recommended by SDLC to DLC | Total | 3,17,995 | 17,046 |
| | | Individual | 3,08,662 | NA |
| | | Community | 902 | NA |
| 4 | Number of claims approved by DLC for title | Total | 3,09,564 | 16,351 |
| | | Individual | 3,08,662 | NA |
| | | Community | 902 | NA |
| 5 | Number of titled distributed | Total | 3,01,200 | 15,296 |
| | | Individual | 3,00,321 | NA |
| | | Community | 879 | NA |
| 6 | Extent of forest land for which titled distributed | Total | 5,39,277.45 | 37,678.93 |
| | | Individual | 4,84,025.80 | NA |
| | | Community | 55,251.65 | NA |
| | Average amount of land distributed per title holder (in acre) | Total | 1.74 | 2.46 |
| | | Individual | 1.61 | NA |
| | | Community | 62.86 | NA |
| 7 | Number of claims rejected | Total | 1,31,970 | 16,958 |
| | | Individual | 1,31,361 | NA |
| | | Community | 609 | NA |

Source: Government of India, Ministry of Tribal Affairs, 2012

Note: Individual and Community wise data is not available in case of Jharkhand.

The Shortcomings in Implementation process of FRA

There have been procedural bottlenecks in implementation of FRA. They arise out of inadequate knowledge of FRA and its implications. So the pace has been very slow. The Stay Orders by the courts and the elections to the State Assembly as well as Parliament have delayed the implementation. Presentation of the members of the Forest Rights Committees (FRCs) and DLCs have not been done which could have helped the implementation of the Act. Also FRA does not sit well with other existing Acts like Wild Life Protection Act (WLPA), Forest Conservation Act (FCA), etc. The restrictions provided in these legislations will continue and may even override the FRA. A compendium of all circulars, letterheads, memos of instructions, guidelines of FRA issued by MOTA, MOEF and other Central government and State government departments should be prepared and communicated to the officials at the ground level for their Institutional structures and incentives have been developed and identified for speedy implementation and this has been done in a mission mode. The Ministry of Tribal Affairs (MOTA) wanted to work cohesively to make the Act effective. Repeated assurances have been given to indicate that the Act will not weaken or threaten the Forest Departments functioning. On the contrary, it is viewed as an excellent opportunity for the Department to work with *Gram Sabhas* and local communities. This would ideally make forest management easier and effective for the Department, keeping in mind the severe shortage in lower level staff.

Looking at the pros and cons, it is more or less agreed upon that tenure insecurity has made developmental schemes and programs (e.g. *Indira Awas Yojana* for housing, drinking water, et al), inaccessible to the Scheduled Tribes and other Forest Dwellers. The Act addresses this issue and will have positive impacts on overall quality of life of the tribal people. The Tribal Sub-Plan (TSP) under which the States are supposed to earmark funds exclusively for the welfare of Scheduled Tribes can be a window of opportunity for developmental investment. To take this Act forward in the right spirit will require commitment from both State and Civil Society. Development actors are attempting to figure out strategies that would facilitate synergy between their work in JFM and provisions of the Act. It is understood that unless land / tenure rights are established, services cannot be derived out of it. Settlement is the first step and requires extensive research at the grassroots. Detailed procedures have been laid out in the proposed rules, for the Forest Rights Committees (to be constituted in each *Gram Sabha*), to inquire into the individual and community rights of eligible beneficiaries and make suitable recommendations to subdivision level and district level committees, for incorporation of these rights into Government Records. The proposed inquiries by Forest Rights Committees are of 'quasi judicial' nature and it is unrealistic to expect the Forest Rights Committees to act in a judicious manner. This gives NGOs an excellent opportunity not only to track the progress of implementation of the Act but also to ensure transparency and accountability from an early stage. As of now, there exists a vague understanding of the Act at grassroots. The emerging gap between policy and practice can only be bridged with a robust communication strategy which provides clarity on provisions at all levels.

Conclusion and Way Forward

A critical review on the process and outcome of the FRA Implementation clearly highlights the need for closer scrutiny of community rights under the Act, pointing out that state governments have been paying inadequate attention to its last mile implementation. Several issues emerge from the review, which are important for designing the study on policy/structural issues and setting its objectives. Implementation and operation is crucially linked to grassroots governance, which is possible only by empowering the Gram Sabha to take control of implementation in order to protect the rights of tribal and other forest-dwelling communities.

The FRA is a landmark in the struggle of forest dwellers and other tribes to get legal recognition of their environmental rights over forests. The FRA definitely has converted key environmental interests of forest dwellers into environmental rights that could be enforced by courts. The strength and value of the FRA, however, have been diluted by the rules that have been approved to implement it and by the rules that are missing, leaving gaps instead of covering the entire charter of forest rights (Perera, 2009). As is often said, India has some of the best environmental and human rights legislation of any country, but implementation is often poor. One problem is that many laws seem to contradict each other, or contain self-contradictory clauses. This is particularly evident in the Forest Rights Act 2006, which has been rightly celebrated as a milestone, granting Tribal and other forest-dwellers their natural rights, long promised and overdue (Padel, 2012). There is no doubt the Act has provided a stopgap measure for movements opposing dozens of destructive displacement projects that can not go ahead until forest rights have been settled. Another problem with the Act, however, is that it marginalises community rights claims compared to individual rights. Applications for community rights are harder to make and few have been granted. Granting individual rights to forest plots may prove to undermine the essence of tribal culture as the further of forests (Sharma 2006). Processing community claims over forest is probably the best way to ensure tribal communities' long-term food security.

At the all India level (as on 31st December 2012) by comparing the number of claims processed (32,36,539 claims filed and 12,75,570 titles issued) with the estimated number of people economically dependent on forests (275 million) suggests that the FRA has done little to extend property rights in its first three to four years of implementation. Only a minority of individual claims has resulted in the issue of titles. Worse still, very few number community titles have been issued to claimants in some states. In addition, most of the claims for titles from traditional non-tribal forest dwellers were rejected because understandably the claimants could not prove that they satisfied the requirement of using forest land for 75 years. Lack of information regarding the provisions of the Act has also prevented stakeholders from submitting their claims to the authorities. Similarly, lack of co-ordination between government departments, corruption, and attempts to use forest land for development projects and commercial plantations, are also important constraints on the implementation of the FRA. At its first joint meeting on 17 May 2010, the national FRA committee stated on the issue of titles that 'the high rate of rejection without field verification by the officials has made a mockery of the provision of the law' (Government of India, 2010). It is also of the view that claims are often rejected without even informing the applicant

and in most cases no reason is cited. At the same time the claims are also settled without proper verification and survey (ibid). All these facts and findings lend credence to the evidence of the very poor performance of the FRA in Indian states as a whole during the last few years after it came into force. This illustrates the difficulties of granting formal property rights to forest dwelling peoples and communities. A comprehensive Forest Rights Bill, which learns from mistakes, removes the anomalies of the FRA and creates a transparent implementing authority, is urgently needed to sustain the livelihoods of forest dwelling communities.

Further translating rights into livelihood gains and conservation would require convergence of FRA with laws and programs like Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), Watershed and livelihoods development programs. Convergence plan should ideally emerge from the plans developed by *gram sabhas*/community in exercise of authority for conservation and management of community forest resources and adjoining areas. Technical support should be provided to the *Gram Sabha* and communities to prepare plans for development of forest land and resources in the CFR areas. Government should come up with framework to pull out resources/components from the existing programs (MGNREGA, Watershed) to implement the community plans.

The drive to acquire both fertile agricultural land and village commons for “Special Economic Zones” and for big private companies has been moving on a fast track. Granting of mining leases to private companies in forest areas has increased in recent times. Despite the alarming rate at which ancestral land is being lost to companies and private developers, the FRA provides tribal communities a political space to articulate their forest rights. The passage of the FRA encourages forest dwellers all over India to build an alliance, embracing India’s democratic and pluralistic political and social organisations and based on environmental and social justice. However, the state-capitalist nexus will be a formidable obstacle to implementing the FRA. The decisions of the high courts and the Supreme Court of India on legal challenges will reveal how the judiciary considers forest dwellers’ rights elaborated in the law.

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SUSTAINABLE FOREST MANAGEMENT: GLOBAL TRENDS AND OPPORTUNITIES

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ABSTRACT

Forests can be considered as a “Treasury” for any country or region, as they are the rich source of many essential elements and a large number of people depend upon forest for their livelihood (Panish *et. al*, 1950, Ambrose-Oji B., 2003). But in some previous years these forests have attracted worldwide attention due their exhaustive, unmanaged use at the rate faster than their renewal. Sustainable management and conservation of Forests is the main issue, the whole world is concerned about.

It is well known that forest biomes are extremely diverse (Zobel *et. al*, 1976). These tropical forests also provide many renewable goods and services essential for human benefit (Khasa *et. al*, 1995). They are ready source of survival and income for a huge number of people living in and near these forests by providing agricultural products, fuel wood, medicines, materials for rural construction and fencing, and other non timber forest products (NTFPs)

(http://www.cifor.org/publications/pdf_files/research/livelihood/Forests-poverty.pdf, (Di Stasi *et. al*, 2002). More over these forests play the main role in conserving our mega bio-diversity and the love of the tribal people for these forests has been maintaining them alive in the past years.

Keywords: Sustainable management, conservation of Forest, tropical forest, construction and fencing

INTRODUCTION

Forest Biodiversity includes all species of plants, animals and micro-organisms and the variation between them, and the eco-systems of which they form a part. To a large extent, the world’s biodiversity depends on maintaining patterns of resource use that facilitate the continued renewal of ecosystems. A number of factors work in using a natural resource sustainably. Although required elements for the sustainable use of natural resources varies with time and locale.

Today Forests are shrinking as a result of pressing needs for capital and land to invest in alternative sectors with higher financial returns, consequently our biodiversity is in danger (Bawa and Seidler, 1998). At some point, however, countries tend to undergo a forest transition where forests are revalued for multiple goods and services (Rudel *et. al*, 2005). First, richer societies consume more wood-based products, creating incentives for new forest plantations. At the same time, growing demand for recreation areas, clean water, etc. lead societies to value forest ecosystem services. The need to protect forest ecosystems and to maintain or restore their ecological quality is

now an important driving force, shared by many conservationist and foresters. It is very essential to conserve forest resources if we wish to conserve bio diversity and water and soil resources as well as for meeting our needs for wood and non-wood forest products. However generally the planning for the conservation is not systematic and thus most of the goals cannot be fulfilled. So a systematic approach for the conservation should be followed. (Margules and Pressey, 2000).

Up to early 70's forests were basically considered agents for industrialization and economic development. Sustainable timber yield has been one of the basic credence of forest management for considerable length of time. The primary purpose of forestry was timber production and all other goods and services of the forest were considered as by-products (Gluck, P., 1987). But in early 70's global concern about the forestry and forest significance for the rural community has broaden the denotation. In 1970's and 80's the need to manage forests to reach multiple objectives emerged, particularly in USA. Now the whole world is trying to apply a new forestry management system i.e. "sustainable forest management", which means creating an economic system that provides for quality of life while renewing the environment and its resources. It means taking the long-term view of how our actions affect future generations and making sure we do not deplete resources or cause pollution at rates faster than the earth is able to renew them (*In Rio declaration on Environment and Development*). International Tropical Timber Organization has defined the sustainable management as "the process of managing permanent forest land to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and services without undue reduction in its inherent values and future productivity and without undue undesirable effects on the physical and social environment."(ITTO 2005).

World leaders at the United Nations Conference on Environment and Development (UNCED) in 1992 termed the Earth Summit in Rio de Janeiro⁶, Brazil developed a Statement of Forest Principles that consisted of 17 points outlining strategy and means for protecting the world's forests. Five important documents resulted from this summit are: (Schaeffer and Elliott, 2000).

- The Rio Declaration on Environment and development includes 27 principles defining the right and the responsibilities of nations as they pursue human development And well being
- Agenda 21 reflects a global consensus and commitment at the highest political level on how to make development socially, economically and environmentally sustainable.
- A non legally binding, authoritative statement of forest principles to guide managing, conserving and sustainably developing all types of forests which are essential to economic development and maintaining all forms of life.
- The United Nations framework convention on climate change aim is to stabilize green house gases in the atmosphere at concentrations that will not dangerously upset the global climate system.
- The convention on biodiversity was signed by more than 150 governments at the Rio<Earth Summit> in 1992.

Following in most of the countries have made regional and international paradigm and indicators that can monitor and evaluate the success in achieving sustainable forest management.

Sustainable forest management(SFM) is basically a “conservation and development” strategy which encompasses a broad range of scope to us as well as future generation, stock holders, multiple products and services etc (Kant, S., 2004). It generally aims at encouraging conservation and management practices, which are environmentally, socially, and economically more sustainable (Adamowicz W.L. and Veeman T.S., 1998). This evolving concept is transforming current forestry scenario, which is found very effective in northern hemisphere (Poore, 2003, Sayer *et. al*, 1997). Sustainable forest management comprise a management that efficiently maintains the forest’s ecological functions, processes and structure in a well going condition, improve or sustain soil and water quality, does not require harvesting of any particular type of product from the forest, environmentally, socially and economically beneficial for the society.

Sustainable Forest management consists of Seven main thematic elements:

- Extent of Forest Resources
- Forest Biological Diversity
- Forest Health and Vitality
- Productive Functions of Forest Resources
- Protective Functions of Forest Resources
- Socio-economic functions of Forests
- Legal, Policy and Institutional Framework

Besides these forest ownership and management is also an important element of the sustainable forest management. In this chapter, we analyze and discussed new data on forest area and management; recently released by FAO and its member countries on Global Forest Resource Assessment 2010.

MEANS AND MATERIALS

In recent years, there has been a change in the idea of how forests should be managed. Instead of merely as a source of timber, forests may be viewed as providing a range of ecosystem goods and services. This change is in part related to the understanding of how human activities can be made consistent with biodiversity and landscape conservation (Berkes, 2004). There have been numerous initiatives and processes in the world to streamline the efforts towards *Sustainable Forest Management*. SFM is thus a concept of efficient and effective management. SFM is an important aspect of sustainable development as a large ratio of the humans and organisms are directly/indirectly dependent/benefitted by forests (Oyono et al, 2005; Chomitz K.M. and Kanta Kumari, 1998)
http://re.indiaenvironmentportal.org.in/files/valuation-forests-himachal_r.pdf,[http://forums.forestresearch.gov.uk/website/pdf.nsf/pdf/sebreport0703.pdf/\\$FILE/sebreport0703.pdf](http://forums.forestresearch.gov.uk/website/pdf.nsf/pdf/sebreport0703.pdf/$FILE/sebreport0703.pdf). Thus for sustainable forest management and development it is important to review frequently the status of the progress made after implementation

of new rules, regulations and strategies. In recent years, FAO has increased its efforts to enumerate the potential extent of future wood supplies from forest plantations. Within the context of the Forest Resources Assessment, considerable effort has been applied to gathering and refining data on forest plantation areas, species and yield. FRA 2010 is the most comprehensive assessment to date. It examines the current status and recent trends for more than 90 variables and all types of forests in 233 countries and areas. Some of them are discussed here briefly.

Global Forests Status:

According to the recent data released by FAO 31% of total land area is covered by forests which correspond to approximately over four billion hectares area of the land. Although some continent has shown an increase in their forestation area, some are losing their forestation. But this is noticeable that net increase in forest area is greater than the net decrease therefore, nullifying the overall deforestation when compared from 2000 to 2010. Figure 1 gives an approximation of the forestation trend worldwide. According to the Forest Resource Assessment (FRA) 2010, 7% of total forest are planted forest, 36% of the total are Primary Forest while remaining 57% are other naturally regenerated forests. There is a decrease in primary forestation in comparison to the previous assessment i.e. (FRA) 2000, while all the continents have shown an increase in planted forest area. Asia has shown the maximum increase in planted forest area in comparison to previous assessment followed by north and Central America (Figure2).

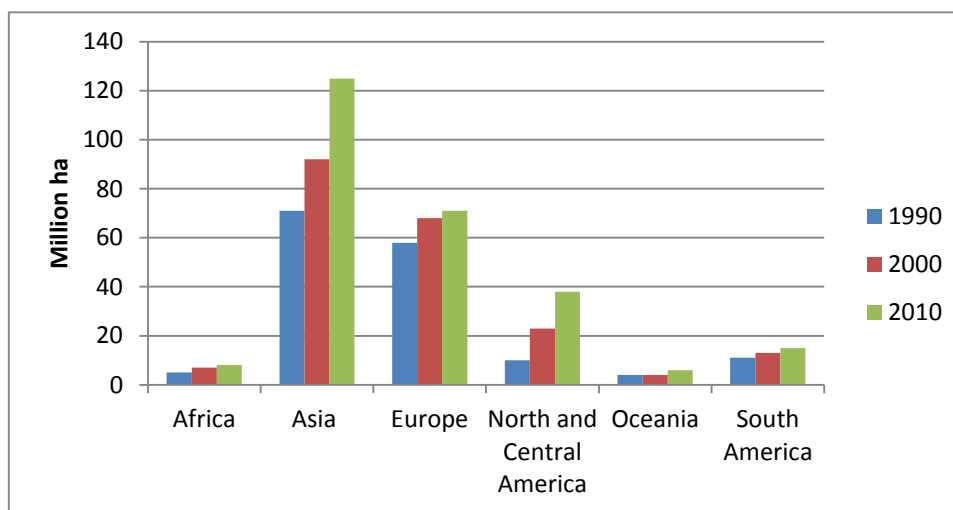


Fig. 1 Trends in Forest area worldwide (according to FRA 2010)

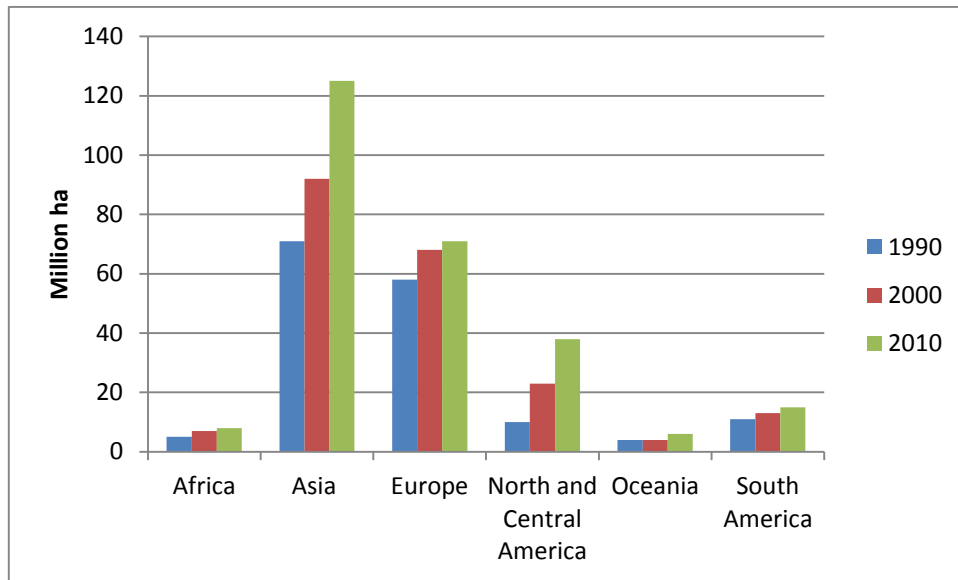


Fig. 2 Changes in Area of planted forests (according to FRA 2010)

Forest fires are one of the major causes damaging the forests. These fires are not only harming the forests but also affecting wild life, properties and human life. Moreover, most of these forest fires are not properly reported. Furthermore, forest insects and pests are also damaging the forest with an unprecedented rate especially in Canada and US. Severe storms and earthquakes have also affected a large area of Forests (FRA2010).

Forest Carbon Stock: forest carbon stock is an indirect measurement of sustainable forest management (Masera *et. al*, 2003). Plantation or rehabilitation tends to increase or conserve forest carbon stock, while poor forest management reduced the forest carbon stock. Forests play an important role in carbon sequestration and its conservation. They can be considered as carbon sink or carbon source for the future (Dixon, 1994). Below is the trend of the global forest carbon stock (figure 3).

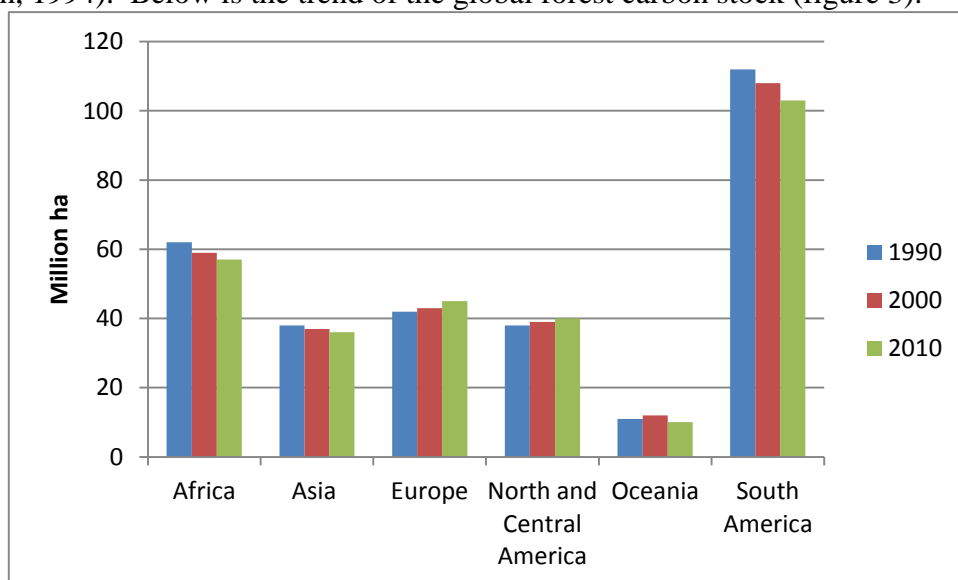


Fig. 3 Global forest Carbon stock trend (FRA2010)

Forest Protection

Protected areas include natural preserves, protected landscape/seascape, wilderness areas, game reserves, natural monuments, and managed resource protection areas (Pimbert and Pretty, 1995). The purposes for managing protected lands focus on protection and conservation of natural functions, standards, and biodiversity. Wood harvesting and land clearing for settlement remain a menace in protected areas of many countries. FRA data indicate that about 13% of the world's forests are legally protected which has been increased by 94 million hectares since 1990 while two third of this increase has been since 1990. The proportion of forests under these protected areas is shown in table 1 (Data in approximation).

Table 1: proportion of forest comes under legally protected area (FRA2010)

| Region | Proportion of forest under legally protected area (in %) |
|---------------------------|--|
| Africa | 13.5 |
| Asia | 23.5 |
| Europe | 4.0 |
| North and central America | 10.1 |
| Oceania | 16 |
| South America | 17 |

Forest Biological Diversity

Forest Biological diversity can also plays an important role in the proper functioning of forest system as in agro ecosystems (Altieri M.A., 1999). So its preservation is one of the important issues. According to FRA 2010, 12% of total world forest area is designated for conserving biological diversity, and most of these forests are located in protected areas, which comprise approximate 13% of total world forests. Below is the graph showing the status of the forests designated for the conservation of biodiversity from 1999-2010 (figure 4).

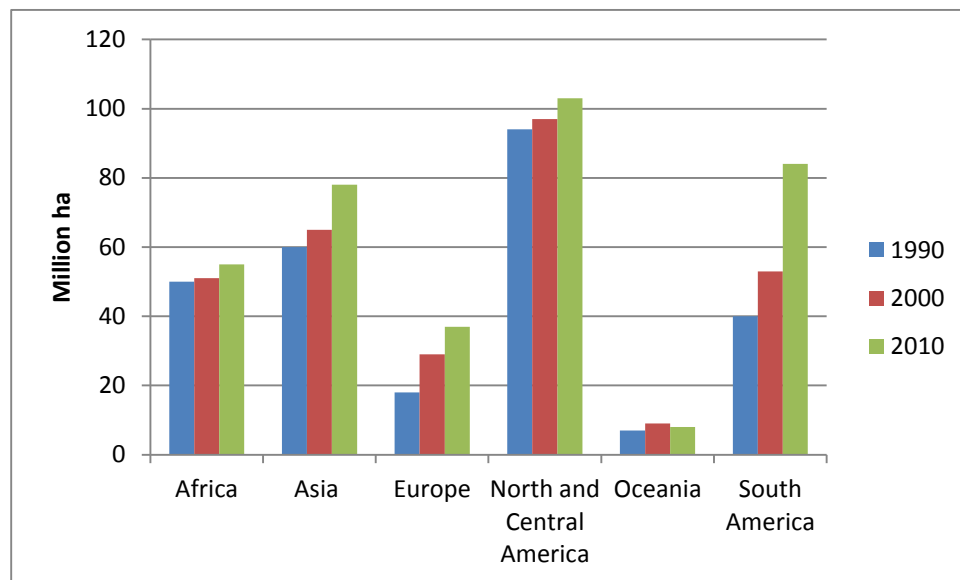


Fig. 4 forest area designated for conservation of Biodiversity (according to FRA 2010)

Forest Productive functions

It has been reported that 0.7% of total growing stock of wood is removed for the fuel and industrial purposes, which amounted to 3.4 billion cubic meters annually. Approximately 1.9 billion hectares of forest land allotted for wood and non timber forest products. According to FRA report 2010 there is a decrease in this area by more than 50 million since 1990. The graphs below show the trend of total wood removal proportion of usage in Industry and for fuel.



Fig. 5 forest trend in wood removal in 1990 (according to FRA 2010)

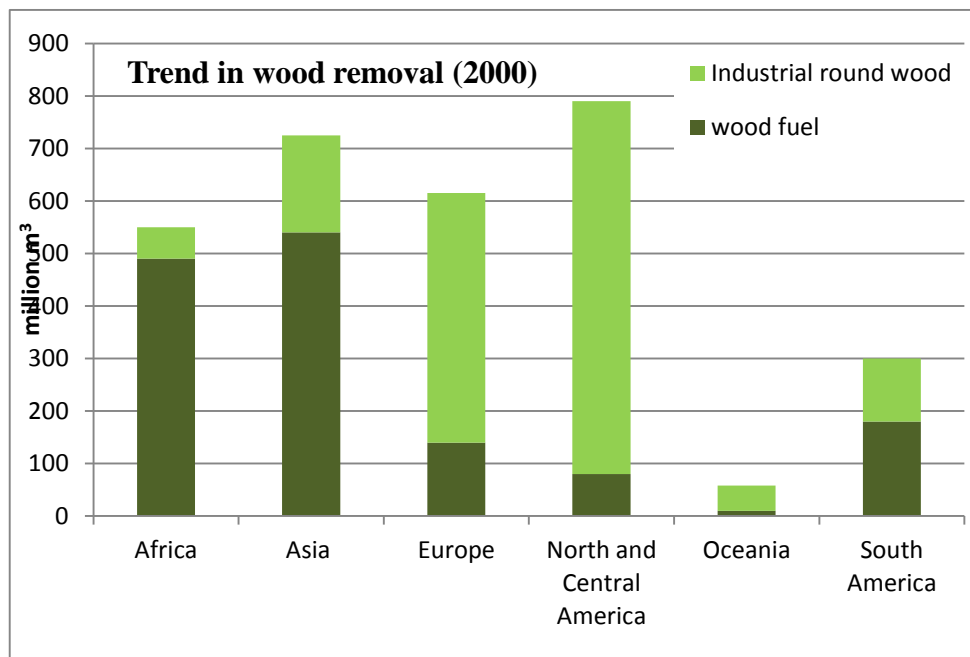


Fig. 6 forest trend in wood removal in 2000 (according to FRA 2010)

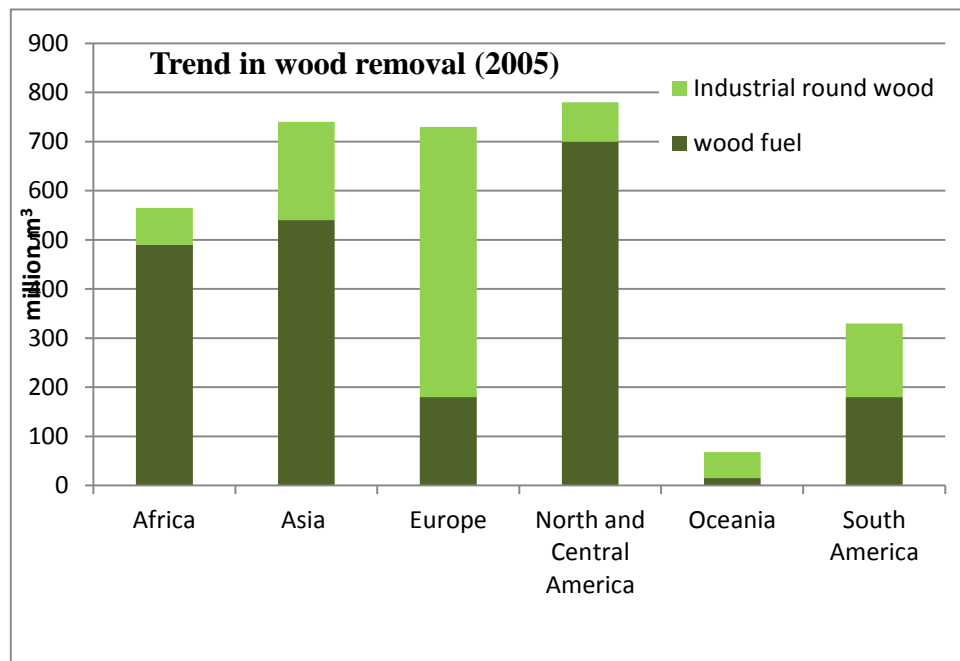


Fig. 7 forest trend in wood removal in 2010 (according to FRA 2010)

Forest Protective and socio-economic functions

Forest also provide protection to a number of environmental factors (Motta R. and Haudemand, 2000). Under the forest's protective function an initiative has been taken under which some proportion of the total forest land area is designated for soil, water, coastal area conservation and for other purposes like avalanche control, sand dune stabilization, desertification control, etc. according to FRA 2010, the total forest area designated for protective functions mainly for soil and water conservation has been increased by 59 million hectares since 1990 to 2010.

Besides this, some countries designated some of its forest reserve for recreation, tourism, education or conservation of cultural and spiritual heritage. Globally 4% of total forest area is designated for these type of social activities. The regions with good data on these social services are East Asia and Europe where 3 and 2 percent of total forest area respectively is managed for social activities on primary basis. In economical perspective the value of wood removal was stagnant in the period 1990-2000, but showed an increase of about 5% within five years i.e. from 2000 to 2005 signifying that wood removals prices have recovered from their decline phase i.e. 1990-2000. However non timber forest products valued US 18.5 billion for 2005 which is reported to be underestimated value by FRA2010 as a large number of data is missing from many countries. Data suggests that there is a steep declination in employment in forest establishment, management, and use in some regions like Europe, East Asia, and North America, while most of the other countries reported increase in the employment in this sector. Coming to the ownership, a large portion of the words total forest area (about four-fifth) is owned by government or other public bodies, they are responsible to managing these forest areas. But some countries are showing increasing trend of involving private companies, communities or other individual bodies for public owned forest management.

Criteria and Indicators and stake holder's Participation

Criteria and Indicators approach for sustainable forest management was initiated by International Tropical Timber Organization (ITTO). It is not only a powerful policy instrument but also a practical tool. Criteria and Indicators, for sustainable management are important tool to improve the quality of forest management (http://www.harfolk.ca/Publications/Chapter_6.PDF, CIFOR,1997, CIFOR 1996). There are several methods/process developed for achieving a sustainable forest management and depending upon the process, area, environmental, economical conditions, criteria and Indicators are set for a particular process. These criteria and Indicators are often set on national level and frequently used by Government and policy makers to monitor the changes.

Some of these important processes for achieving sustainable forest management are:

- Helsinki Process
- Montreal Process
- Tarapoto proposal
- Dry Zone Africa Initiatives
- Near east proposal
- ITTC Initiatives
- African Timber organisation
- Regional initiatives for dry forest Asia
- The Lepaterique process of Central America

A *Criterion* is a category of conditions or processes by which SFM may be evaluated. A criterion has a set of related indicators that are monitored periodically to assess change. An *Indicator* is a quantitative or qualitative measure of a characteristic of the criterion to show current performance and trends in performance (Canadian

Forest Service, 1997). The people having an interest or “stake” in the forests are referred as stake holders and various stake holders have different rights and responsibilities (Colfer, 1995). Stake holder’s participation plays an important role in shaping the C&I related to social and economic concerns (Pokorny, 2004) . They participate in determining how the forests should be managed. The stakeholder may be an environmental NGO, public or private forest owner, local community or a forest industry or a local group.

But there is a possibility that the decisions made according to the stakeholder, always maintained the level of other values like sustainable wood supply, cultural heritage values etc. Mc Donald and Lane discussed three key issues regarding the stakeholder’s participation in sustainable forest management (McDonald and Lane, 2004). Depending upon the role it becomes necessary to identify the right one as a stakeholder for C&I determination. Colfer has discussed the role of different communities, firms and individuals as stake holders and formulate a method to choose the best one.

Forest Management and Certification

Forest certification is a tool which denoting concerns about forest management and deforestation and to promote the conservation/maintenance of biological diversity (Gullison, 2003). It was introduced in 1993. It is a market based initiative which intends to improve the quality of forest management and promoting higher prices or better market access for wood products derived from sustainably managed forests. Forest certification refers to two separate processes viz., forest management unit certification (FMU) and chain of custody certification (COC). There are a number of certification schemes, which aimed at promoting sustainable forest management together with Criteria and Indicators. Certification is a process whereby a certification body appraises the quality of forest management in relation with the predefined standards (Kooten *et. al*, 2005). Forest certification is basically a market driven tool which plays a different role for different bodies. According to Rametsteiner and Simula “For industry and trade, it is an instrument for environmental marketing and market access. For buyers and consumers, it provides information on the impacts of products they purchase. For forest owners and managers, it is a tool for market access or gaining market advantage. For governments, it is as soft policy instrument to promote SFM and sustainable consumption patterns. For environmental movement, it is a means to influence how forests are managed to promote, inter alia, biodiversity maintenance.” It occurs at sub national level, used by market players for establishing proof of sustainable or good forest management and found to have limited but positive direct effect on sustainable forest management (Rametsteiner and Simula, 2003). Today more than 50 certification programmes exists worldwide, out of which two largest International forest certification programmes are Forest Stewardship Council (**FSC**) and Programme for the Endorsement of Forest Certification (**PEFC**). Figure 4 shows the percent proportion of total FSC and SFI certified area shared by the various regions and sub regions

<http://www.dovetailinc.org/files/DovetailCertReport0310b.pdf>),

<http://www.pefc.org/about-pefc/who-we-are/facts-a-figures>.

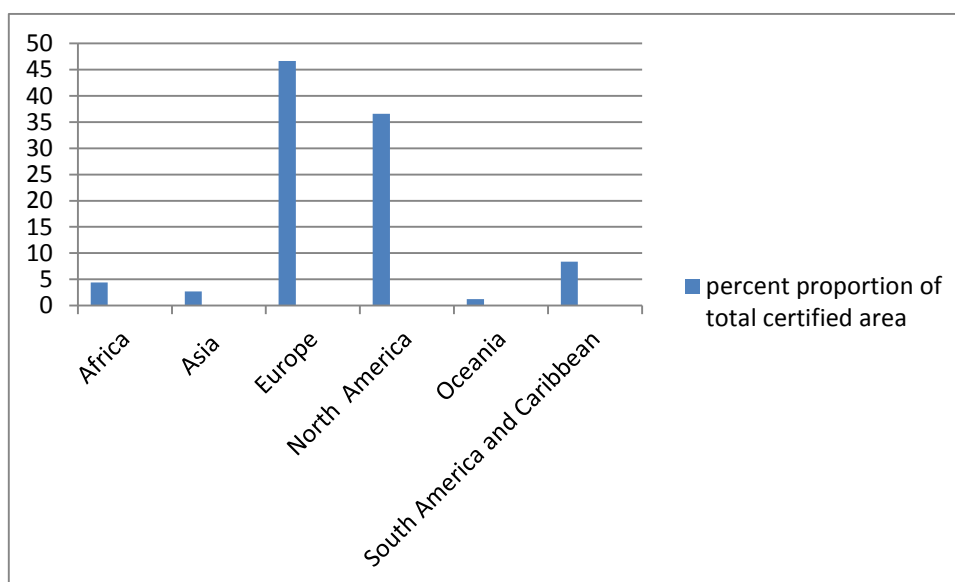


Fig. 8 Percent share of total FSC certified area by various regions

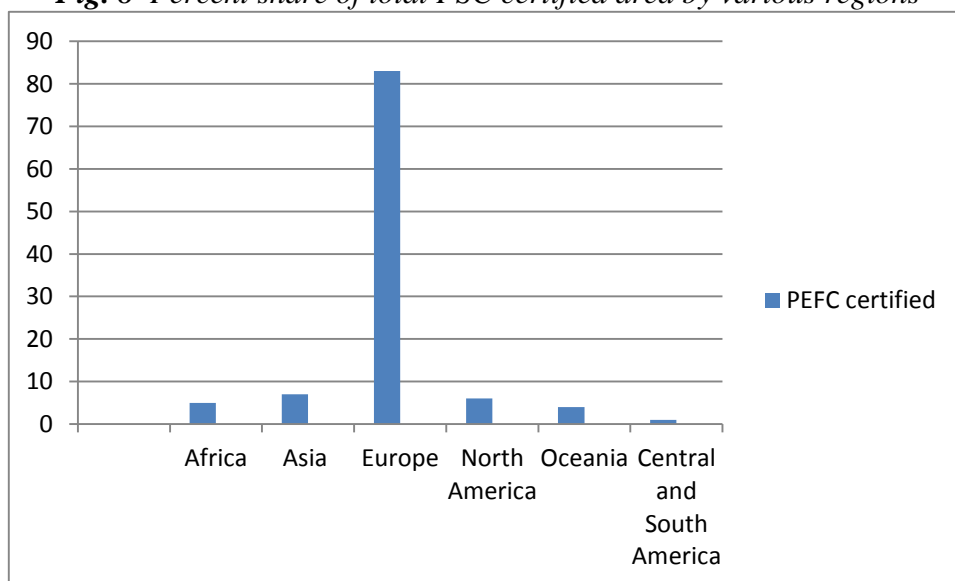


Fig. 9 Percent share of total SFI certified area by various regions 2012

According to the report till February 2010 globally, a total of 120,016,764 Hectares area was FSC certified in which 81 countries were involved and a total of 987 certificates were distributed. While PEFC figures shows, that forest certification is also increasing over the years with increase in total area certification. Overall, it seems that forest certification aids in progress of sustainable forest management programmes.

However, forest certification in India is at early stage and it has only one FSC Forest management unit certificate for 644 ha rubber plantation in Tamil Nadu). But now the country is meeting the need of forest certification so that it can be benefitted by this process. WWF-India in association with Smart Wood/SWISO organized a consultative meeting on forest certification in India. The objectives of this meeting were (1) understanding the scope and limitation of forest certification in India, (2) Identifying suitable approaches to promote forest certification and (3) Create awareness on credible forest certification and the benefits to the stake holders.

http://awsassets.wwfindia.org/downloads/forest_certification_meeting_background_1.pdf

KEY FINDINGS AND EMPIRICAL OBSERVATIONS

Security of resource conservation and sustainable livelihood

As sustainable forest management aims at meeting all the requirements of current generations without neglecting the necessity of the future generation, which will also, requires those resources SFM gives a platform to meet both the requirements.

Global Initiatives

Many Ministerial and scientific conferences held on sustainable forest management for European and non European countries. Being simple, transparent, cost effective and robust “Criteria and Indicators” approach becomes popular in monitoring and evaluation of all the SFM development projects, which gives an opportunity to involve primary stakeholders. As different regions have different diversity therefore, CandI approach cannot be applied uniformly to all the sites, hence several initiatives have been taken to develop local Criteria and Indicators depending upon the specific region or site, for which ecological, social and economical needs should be taken into consideration. FRA 2010 data shows that there has been a significant progress in policies, laws and national forest programmes. According to the report countries that have:

- ✓ Forest policy statement--- 143
- ✓ Countries which have issued or updated their statements since 2000--- 76
- ✓ Countries who reported their current forest law have been enacted or amended-- - 69

Approximately 75% of total world’s forests are covered under a national forest programme. Forests are now managed for multipurpose usage as presented in table 2.

Table 2: Percent total forest area designated for multiple usage (FRA2010).

| Forest function | % of total forest Area |
|-----------------|------------------------|
| Production | 30 |
| Protection | 8 |
| Conservation | 12 |
| Social services | 4 |
| Multiple uses | 24 |
| Other | 7 |
| unknown | 16 |

It is worthwhile to notice that there is a steady increase in the area of forests, which are managed under a forest management plan, a tool for achieving sustainable forest management, although the data is available for 80% of Forestland but it is encouraging (figure 5).

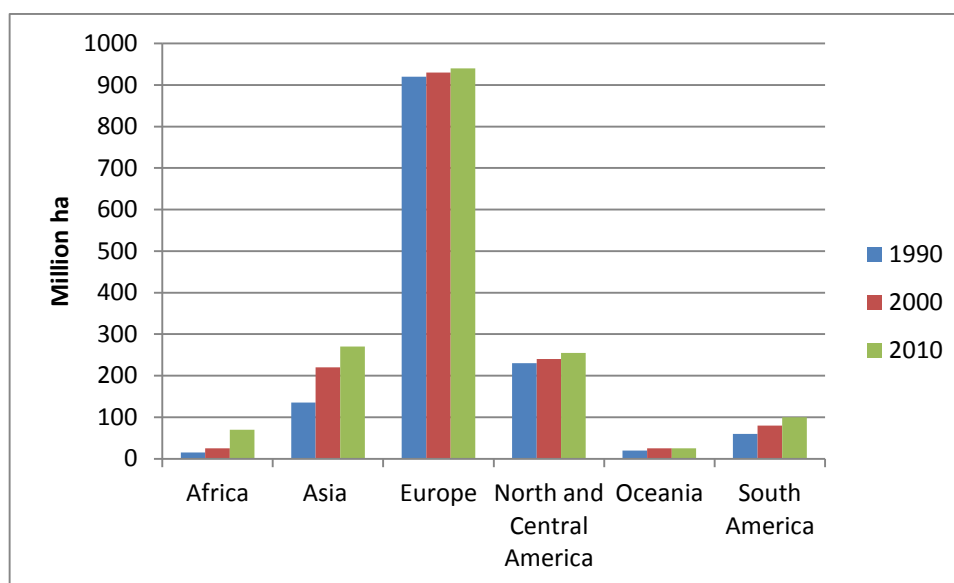


Fig. 10 Forest area under a management plan

Further, Forest Resource Assessment 2010 shows that progress toward sustainable management is going on at global level. All the participating countries are focusing on to recover their forests while simultaneously maintaining the balance between ecological and human demands. Plantation provides approximately 25% of world industrial wood fiber. The role of plantation forests, in meeting future wood and fiber demands, will increase during the next few years, irrespective of future rates of plantation establishment, however it is important that forest plantations be managed in accordance with a defined end-use objective and in compliance with sustainable forest management principles and practices (Carle *et. al*, 2002). It is noticeable that global planted forest proportion is increasing annually although total forest area is decreasing between 2000-2010, but at slower rate in comparison to 1990-2000. All the regions or sub regions showed an increase in planted forest area consequently an overall increase by 264 million hectares during 2005 to 2010.

SFM: Present scenario in India

Development of a framework of Criteria and Indicators (CandI) for sustainable forest management has been given a high priority in the national forest policy (National forest policy, 1988). Moreover, Bhopal-India Process, which is a national initiative, was undertaken to propose Criteria and Indicators for sustainable forest management in India (Kotwal *et. al*, 2008). This framework provides critical information to the forest managers and others in forest related decision making. In India where a diverse variety of forests exists i.e. evergreen to dry, http://www.indianetzone.com/2/indian_forests.htm, it is not easy to manage them and set Criteria and Indicators for them, which should be applicable to all the forests type. Under these conditions, developing a common framework, which should be

homogeneously applicable for assessing the sustainability of forest, is a challenge. The IIFM-ITTO research project on sustainable forestry development endeavors criteria and indicator approach for sustainable forest management at FMU level.

Presently in India, the main focus is to develop standard Indicators for B-I process. A set of criteria and indicators for dry zone forests have been developed, and for tropical forests, it is under development under a project of ITTO. A sustainable forest management cells were created in the ministry of environment and forests and also in some state forest departments. Different teams have been constituted in several states for pilot testing and also for developing CandI for forest plantation, and work is now in progress (Udgata and Dash, 2008). India has also constituted a national certification committee to develop certification standards and processes and their accreditation. A national REDD+ programme is also initiated with the aim of increasing India's forest carbon stock.

According to ITTO status report 2011, by 1970 India was losing its forests at a rate of 1.3 million ha. per year, but now it has net forest gain of about 25,000 ha per year since 2000. Although it is still losing its natural forests but the extensive plantation rate has given it the net forest gain. A very large number of people are in forest-related employment, and over 200 million people are considered to be forest-dependent. India's wood-based industry is facing serious problems in obtaining raw material and India is importing wood timber. Indian subcontinent is rich with Biodiversity and India is one of the mega biodiversity countries in the world. Indian government has taken initiatives to protect upland watersheds through forest conservation and afforestation but the list of critically endangered species of plants is increasing. India's forest department is somewhere lacking in dealing effectively with problems.

Challenges/Issues: Attaining sustainable forest management is not as straightforward as seems to be. When we go through a process in a particular region to achieve sustainable management, with the opportunities a number of barriers encounter some of them are easy to come across while some are very troublesome (<http://www.cifor.org/miombo/docs/Miombo2007.pdf>). There are some major issues encountered during the application of sustainable forest management (FRA 2010, Rametsteiner and Simula, 2003, Sankar *et. al*, 2000)

- This can cause the loss of biodiversity and the people who are dependent on the non-timber forest products for their income could be affected
- Plantation development can affect the water supply in villages.
- Sharing of benefits from plantation development to improve opportunities for schooling, training and employment
- Soil erosion and contamination etc. Governments generally spend more on forestry than they collect in revenue
- There is a need to develop effective legal, institutional and economic framework for forest conservation and sustainable management, which is a big challenge in many countries.
- Forest certification is still a debatable issue in International Forest Policy
- Issues related to ownership

Opportunities

Today the whole world is concerned and aware of the need to use global forest resources with the future generation in mind (http://www.umweltbundesamt.de/energie/archiv/EPA_resourcespaper_2006.pdf). All the participants like scientists, managers, governments, and other non government organisations are tending towards developing new strategies and goals for managing the forests sustainably. Forestry has also attracted youth worldwide. It has been reported by FRA2010 that per year 60,000 graduates are holding their degree in Forestry. No doubt the issue related to the forest management is very serious for the whole world but fortunately we are tending towards a vision which is going to promote the management which is simultaneously economic, environment friendly, and having minimum of social issues.

Data from FRA 2010 shows that global forest area is decreasing, but at a slow rate. Planted forests are restoring some areas, this is a very encouraging. More and more countries are now taking serious steps for applying this “green management” in their province. It is significant that a large proportion of forest area is under a management plan is continuously increasing, showing increasing inclination towards a sustainable management. Successful ownership and tenure arrangements for SFM depend on a variety of factors such as culture, traditions, political stability and level of economic development. But a situation where several groups utilize forests without clear rules, responsibilities, and control, has a bad impact on sustainable forest management. When the main goal is to produce public goods, Public ownership and management is particularly considered while in many cases tenure by others like individuals, communities or industry seems to have had a positive linkage to manufacturing and living (UNFFS, 2007).

Data shows that still a large proportion of forested lands come under public/government ownership. Enhanced management and protection of these lands will be decisive in achieving sustainable forest management in the future. Sufficient government budgets, appropriate incentives and regulations for forest retention and management, and reduced waste and corruption will be required for improved forest management on public lands. Further two approaches (1) SFM should be considered as a process, which will continue over the time, not a goal which has to be achieved in time span (2) Cluster Sustainable forest management commitments into one coherent framework for action, can make the way to focus on implementation of SFM (UNFFS, 2007). Recently there has been much attention to global environmental issues like deforestation, forest degradation and improving forest management and conservation (Miles and Kapos, 2008; van der Werf *et. al*, 2009). According to the figures number of protected areas, forest under a management plan, forest plantation has increased dramatically and also the involvement of a number of operating bodies whether private or public at national and international level. Recently FAO, in collaboration with countries and key partner organizations, has undertaken a global remote sensing survey – based on a systematic sampling of around 13,500 sites worldwide to provide additional and more consistent information on deforestation, afforestation and natural expansion of forests at regional and biome levels for the period 1990–2005 (Hansen *et.al*, 2010). Scientific implementations are also in progress to enhance forest

productivity, biodiversity, to achieve sustained timber yield and conservation of other values (Bawa and Seidler, 1998). Although more government research in this Biotech field is required and also the process is expensive. These facts indicate the progress towards a management, which acts like a mother function for the forests as well as human being. Even there is a need to focus on ecologically sustainable forest management and now researchers have started on focusing over how to make sustainable forest management “ecologically” sustainable (Lindenmayer *et. al*, 2000). No doubt there are some issues in the process, which we are lacking to resolve but a combine effort of all the nations can come across all the barriers, which will take a long span of time (<http://www.aseanbiodiversity.info/Abstract/52001796.pdf>).

CONCLUSION

From the above discussion, it is clear that we have to go for a long way to completely achieve the targets for a sustainable forest management. Many of the countries have travel so far in the way while some of are in their earlier stage or are preparing to apply the strategy in their region. FRA data 2010 reveals that we are increasing towards a vision of green management, a sustainable management making the greener, wealthy and healthy. A number of schemes and programmes are running for SFM. More and more organizations are stepping towards this joint global initiative. These joint initiatives and global awareness will help in better management of our forests. ITTO status report 2011 reveals that there has been a global change in policy environment in some past year, which is likely to have significant effect on efforts to promote sustainable forest management. Member countries are now conveying the useful information in better way in comparison to previous years, which is effective to reach on a conclusion about the status of that particular region (ITTO, 2011) and data suggest that they are trying to achieve sustainable forest management and moving fast towards SFM goals. However, the evidences reveal that forests are not actually well managed and protected as predicted by the reported data. Better reporting and verification, more areas covered and innovational ideas are required for enhance SFM in future. These approaches will help sustain, enhance, and restore forests and their innumerable economic, environmental, and social values.

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