

Sustainable Forest Management: Trends, Challenges and Opportunities in India

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Abstract—*The implementation of sustainable forest management in a diverse country like India is a challenging task. To be more effective, criteria and indicators should be incorporated into national forestry legislations and regulation; not only as voluntary application. Being analogous with sustainable development, sustainable forest management also has important implications in the global economic scenario. Besides contributing to environmental, social, and economic well-being of the communities, it also facilitates market-oriented tools like certification and eco-labeling. The objectives of this study is to presents a tool for assessing the magnitude and direction of change in given forestry situations, and this provides critical information to the forest management and other forest-related decision-making. It is an important framework to assist countries collect, store and disseminate reliable science based forest information needed to monitor and assess forest conditions.*

1. INTRODUCTION

The problem of sustainable forest management (SFM) is highly complex and can only be addressed by a range of actions targeted at (i) the policy framework, (ii) strengthening of governance, (iii) removal of market distortions and engaging market actors, (iv) full valuation and sharing of forest benefits through market and other mechanisms, (v) capacity building, and (vi) mobilization of adequate financial resources. Countering the drivers of deforestation and forest degradation to enable sustainable forest management will require, among other factors, greater innovation, and better coordination in global forestry dialogue, national sectorial planning, and technical analysis that addresses these forces and factors. Capturing the potential of forests to advance poverty reduction, support economic growth, and deliver local and global environmental services will require donors to work in close coordination with governments, the private sector, and other key stakeholders in the forest sector, and to link, forest sector activities with national strategies. This can involve working with emerging external constraints and opportunities.

2. TRENDS AND OPPORTUNITIES

India's current forest and tree cover is estimated to be 78.29 million ha, constituting 23.81 per cent of the geographical area of the country (ISFR, 2011). Forest cover alone amounts to

69.20 million ha, against the recorded forest area of 76.95 million ha. Of the total forest cover, 12.06 per cent is very dense forest (more than 70% crown density), 46.35 per cent is moderately dense forest (40% to 70% crown density), and the remaining 41.59 per cent is open forest (10% to 40% crown density). As per the India State of the Forest Report (ISFR) 2011, forest cover has declined by 367 sq. km compared to the forest cover in the preceding ISFR in 2009. Tree cover outside forest areas is assessed to be 9.7 million ha, and is experiencing an increase over the last few assessments, indicating a rise in green cover in non-forest land in the country. Forest cover in the country has more or less stabilized since the 1980s. As per the estimates of the Forest Survey of India, forest cover has increased marginally from 64.08 million ha in 1987 to 96.2 million ha in 2011. The enactment of proactive forest conservation policies and changes in management approaches from 'timber' to 'forest ecosystem' during the last few decades have curbed deforestation, and promoted conservation and sustainable management of forest. The enforcement of The Forest Conservation Act, 1980 enabled the regulation of widespread diversions of forestland for non-forest uses, and hence put a check on deforestation. The changing priorities of the forest department from revenue generation to conservation-oriented forestry and the practice of doing away with clear felling of trees has resulted in a significant decline of formal pressure of deforestation and degradation on forest ecosystem. However, forest degradation of natural forest due to several factors remains a major concern of forest management. Forest degradation in India The forest degradation is quite evident from low level of growing stock in India forest and declining trend of dense forest in the country. The growing stock per ha of forest area as per both in 2009 and 2011 ISFR is estimated to be around 58.46 m³ per ha of forest area. This is far below the global average of 130.7 m³ /ha and the south and Southeast Asian average of 98.6 m³ /ha for the corresponding period (FAO, 2010). More than 40 per cent of the forest in country are degraded and under-stocked (Aggarwal et al, 2009, Bahuguna Forest cover in the country has more or less stabilized since the 1980s. As per the estimates of the Forest Survey of India, forest cover has increased marginally from 64.08 million ha in

1987 to 96.2 million ha in 2011. 4 et al, 2004). The National Forest Commission report 2006 indicated that around 41 per cent of total forest in the country is already degraded, 70 per cent of the forests have no natural regeneration, and 55 per cent of the forests are prone to fire (MoEF, 2006). As the trend of change in dense forest is concerned, it has remained very moderate as compared to changes in open forest. For some assessment years, the change has been negative to the preceding assessment too. For instance, the moderately dense forest has declined by 936 sq. km from 2005 to 2007. However, the forest cover assessment exercise hardly reflects the extent of forest degradation and it is often difficult to compare the data in this regard due to lack of standardized methodologies (Davidar et al, 2010). The factors affecting forest degradation in India are: i. Critical livelihood–forest linkage of a huge forest dependent population (FSI, 2011; Davidar et al, 2010) ii. Demand and supply gap of forest products, resulting in exploitation beyond its carrying capacity (Aggarwal et al, 2009) iii. Forest fires, over–grazing, illegal felling, and diversion of forest land (both permitted and illegal for non-forest uses due to competing land use demand for developmental and other uses (FSI, 2011; Davidar et al, 2010; Aggarwal et al, 2009; MoEF, 2009; MoEF, 2006). In the forested landscapes of India, the livelihoods of the people living close to forest and within the forests are inextricably linked to the forest ecosystem. People depend on the forest for a variety of forest products for food, fodder, agriculture, housing, and an array of marketable minor forest products which can potentially degrade forest if harvested unsustainably. Field based studies assessing the pattern of collection of these forest products and its impact on local forest found that local livelihood dependence results in degradation (Davidar et al, 2010; Mishra et al, 2008; Arjunan et al, 2005; Sagar and Singh, 2004; Maikhuri et al, 2001; Silori and Mishra, 2001).

Hence, the livelihood concerns of the millions of poor people living in and around forest contribute to forest degradation along with other factors. In the forested landscapes of India, the livelihoods of the people living close to forest and within the forests are inextricably linked to the forest ecosystem. Forest survey of India (FSI) also made a comprehensive assessment of the production and consumption of forests in India and this has been discussed in detail in recently published IFSR 2011. The low productivity of forest coupled with ever-increasing demand for forest products due to India's huge and increasing population contributes to the degradation of forest (Gulati and Sharma, 2000). The development concerns in general and the rapidly growing economy has implications on forest cover and the land use pattern of the country (IIASA, 2009; MoEF, 2009). The forests are also subject to several other anthropogenic pressures like over grazing, shifting cultivation, and vulnerabilities to forest fire and so on (World Bank, 2006; Bahuguna et al, 2002). A host of these drivers are directly linked to the livelihood of the forest dependent communities.

3. CHALLENGES OF SUSTAINABLE FOREST MANAGEMENT

The problem of sustainable forest management (SFM) is highly complex and can only be addressed by a range of actions targeted at (i) the policy framework, (ii) strengthening of governance, (iii) removal of market distortions and engaging market actors, (iv) full valuation and sharing of forest benefits through market and other mechanisms, (v) capacity building, and (vi) mobilization of adequate financial resources.

Countering the drivers of deforestation and forest degradation to enable sustainable forest management will require, among other factors, greater innovation and better coordination in global forestry dialogue, national sectoral planning, and technical analysis that addresses these forces and factors. Capturing the potential of forests to advance poverty reduction, support economic growth, and deliver local and global environmental services will require donors to work in close coordination with governments, the private sector, and other key stakeholders in the forest sector, and to link forest sector activities with national strategies. This can involve working with emerging external constraints and opportunities.

Address poverty and forest governance by promoting forest ownership and access rights. Promote greater recognition of the rights of local and indigenous groups and give greater attention to land tenure, ownership, and rights to resource and access issues. Emphasize and enable stakeholder participation in the formulation and implementation of policies, strategies, and programs to foster ownership and long-term sustainability of the resource. Enhance the role of forests as an engine of economic growth and development. Increase investments in plantations (especially in tropical countries), expand forest certification and overall forest management, and encourage responsible private sector investments, including for community-company partnerships for on-site forest enterprise development, and for market access. Protect vital local and global environmental services and values. Create markets for local ecosystem services, such as water and soil erosion. Seize the potentially enormous financing opportunities emerging in the context of global climate change to increase investments for carbon sequestration and avoided deforestation to reduce emissions from deforestation and forest degradation. Assist countries to integrate the global forest agenda into their own national strategies and policies and to harness the development opportunities available. Use the World Bank's leadership position in the global forest dialogue and take advantage of emerging economic and environmental opportunities (such as the attractiveness of biofuels, for example) to foster sustainable forest management. Integrate forest interdependencies into the design of agriculture, rural development, and natural resource management projects to ensure sustainable economic growth and rural poverty alleviation. . REDD+ and livelihood of the forest dependent communities REDD+ is a financial instrument to incentivize

conservation and sustainable management of forest and thereby reducing GHG emissions from deforestation and forest degradation. It aims at compensating the forest owners in developing countries for conserving the forests by putting a value on the forest carbon stocks, one of the ecosystem services that forests provide. The idea of REDD+ is based on two basic premises. Firstly, the countries conserving forests forgo the economic gain of harvesting them as well as the benefits from alternative land use and hence need to be compensated for the same. Secondly, costs involved in conservation and sustainable management of forests needs to be shared by other countries too as the forests provide a range of offsite ecosystem services that benefits all. Given the livelihood linkage of forests in many developing countries, forest conservation imposes several direct and indirect costs. Hence, any financial mechanism to compensate some of these costs by developed countries would encourage sustainable management of forest in developing countries. Decentralized forest management through devolution of power to local communities is one of the important components of the sustainable management of forest under REDD+ regime. Besides this, REDD+ will also improve the livelihoods of forest-dependent communities by adding value to the collected forest produce through a Public Private Partnership Model that would enhance income and employment opportunities for the local people. Assigning monetary value to the enhanced carbon stocks in the forest that could incentivize forest conservation and management. Since, 75% of forest-based income is from NTFPs (MoEF, 2009) the NTFP enterprises can contribute significantly, to livelihood enhancement in forested areas. In addition, the two main barriers recognized in NTFP management are lack of sustainable harvesting practices and problems of NTFP productivity. To resolve this issue, the GOI would support technology for value addition, certification, and improved marketing of NTFP. Further, sustainable management of forest safeguards the forests for the future generation.

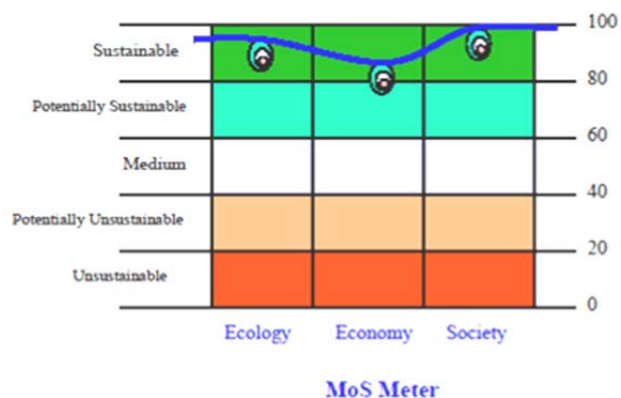
4. FOREST DEGRADATION

Globally, there is no standard definition of forest degradation. It is a complex process and has several drivers, which pose a greater challenge to check the problem of degradation. The IPCC Special Report on 'Methodological options to inventory emissions from direct-human induced degradation of forests and de-vegetation of other forest types' defines degradation as "direct human induced long term loss of at least Y % of forest carbon stocks since time T and not qualifying as deforestation". Given the widespread dependence of such a huge population on forest for subsistence livelihood, arresting forest degradation involves designing and implementing strategies that creates alternative livelihood opportunities and reduce their dependence on forest based activities.

5. SUSTAINABLE FOREST MANAGEMENT

The livelihood requirement of the people fully dependent and partially on forest varies and these need to be taken into consideration while designing the strategies.

Unsustainable harvesting and extraction of fuel wood will be substituted by promoting alternative livelihood and energy.



The proposed REDD+ regime provides an opportunity for subnational actors, like States, to address the delicate issue of poverty in resource rich regions such as forested and tribal dominated States. Sources like biogas, solar energy (solar lanterns and solar street lighting), and improved cook stoves. The expansion of provisions for cleaner cooking fuels such as LPG in rural areas will help to reduce pressure on forests and enhance carbon stocks. This would save fuel wood and reduce pressure on the forests. The GOI has proposed to target 10 million households (in 0.1 million villages in forest conservation areas) for improved stoves (over 30% wood saving). Simultaneously, this would lead to saving of 2 million tons of fuel wood every year amounting to reduction of 3.6 Mt of CO₂ emissions per year. Some other measures could be:

6. FILLING THE GAP OF DEMAND AND SUPPLY OF FOREST PRODUCTS

India's huge population contributes to the large demand base of the forest products. With limited forest cover, the supply of forest products does not match the demand and hence there is a substantial gap. This gap often drives the over-exploitation of the forest. There has been different estimates of the demand and supply of major forest products. The estimates by TERI (Aggarwal et al, 2009) put the demand-supply gap for fuel wood, fodder, and timber at 100, 853 and 14 million tons respectively.

Fuel wood requirements could be tackled through the installation of improved cooking stoves, biogas plants, LPG, and various other means at the village level.

The total annual consumption of wood in constructions and furniture—both in commercial and household sector—as well as for agricultural implements are estimated to be 48.0 million cubic meters in Round Wood Equivalent (RWE). However,

the total production of timber stands at 45.95 million cubic meters, showing a gap of 2.05 million cubic meters annually (FSI, 2011). Of the total production of 45.95 m cum, the production of timber from forests are estimated to be 3.175 m cum whereas the annual potential production of timber from trees outside forest (TOF) is estimated to be 42.774 m3.

Table 1: Forest cover and dependence on firewood

| Name of the State | Percentage of Households using Firewood for Cooking | Percentage of Total Geographical Area of the State under Forest Cover |
|-------------------|---|---|
| Chhattisgarh | 80.8 | 41.18 |
| Tripura | 80.5 | 76.07 |
| Meghalaya | 79 | 77.02 |
| Nagaland | 77.9 | 80.33 |
| Assam | 72.1 | 35.28 |
| Arunachal Pradesh | 68.7 | 80.50 |
| Madhya Pradesh | 66.4 | 25.21 |
| Manipur | 65.7 | 76.54 |
| Odisha | 65 | 31.41 |
| Kerala | 61.9 | 44.52 |
| Jharkhand | 57.6 | 28.82 |

Sources: Census of India 2011; # India State of Forest Report 2011

Firewood constitutes the major source of cooking energy in India and more than 853 million people use firewood for cooking in India (FSI, 2011).

As per the 2011 census, 49 per cent of the households in the country use firewood for cooking. In some states, it is as high as 80 per cent. The forest rich states have higher incidence of firewood use for cooking. This trend is evident from, which shows the forest cover of the states with higher incidences of firewood use. As the total annual volume of firewood use is concerned, it is estimated to be 216.421 million tons and of which 58.747 million tons (27.14 per cent) are sourced from forests. There have been no estimates for the volume of firewood availability from forests and the annual availability of firewood from TOF is estimated to be 19.25 million tons.

India's total fodder consuming livestock population as per the 2007 Livestock Census is estimated to be 518.6 million. Of these 199.6 millions of livestock, depend, partially or fully on forest for fodder (IFSR, 2011). 2 Of the 246.693 million households in the country as per 2011 census

Firewood constitutes the major source of cooking energy in India and more than 853 million people use firewood for cooking in India. In some states, it is as high as 80 percent.

7. CREATING ALTERNATIVE LIVELIHOOD OPPORTUNITIES THROUGH POVERTY ALLEVIATION PROGRAMS

The governments implement a series of rural development activities to generate employment for the rural poor in these forested regions and alleviate poverty. MNREGA, which ensures 100 days of employment to all poor adult population

in the country, is a significant step in this regard. The effective implementation of these programs among forest dependent communities will reduce the dependence of the local communities on forests.

Provision of education to the children and other skill development trainings to youth enables these forest dependent populations to diversify their livelihood options and look beyond forest as their source of income.

Provision of infrastructure and support for improved agricultural practices as well as other natural resource based activities like apiculture would ensure better income to these poor households.

Forests provide a range of marketable NTFPs like fruits, flowers, berries, tubers, resins, honey, leaves, creepers etc. that has great nutritional, medicinal, and other use values. However, many of these products fetches a good price in cities and markets but the collectors (the forest dependent) sale these to the intermediaries at abysmally lower prices. The support for marketing and value addition by creating processing facilities would not only enhance the income but also the employment opportunities in these hinterlands. Approximately, NTFP sector with annual growth rate between 5-15% also contributes to 75% of forest sector income.

8. COMMUNITY LEVEL FOREST MANAGEMENT

Greater involvement of the local communities in the management of forest and devolution of power through access and ownership rights ensures greater tenurial security and improved forest management and conservation.

In recent years, devolution of forest resource management and access rights to local communities has become an important policy tool for many developing countries. Over the last two decades, a profound change has been witnessed in the area of forest resource management, with countries at least partially devolving rights and responsibilities over their forests to the users.

Community based management institutions often considered as a critical precondition for equitable, efficient and effective implementation of REDD+ (Springate-Baginski and Wollenberg, 2010). India has also made significant effort in involving the local community for management of forest through Joint Forest Management (JFM) institutions since early 1990s. However, these JFM institutions need to be further strengthened by empowering the local communities with adequate power and responsibilities (Lele, 2011).

The recent decision to integrate JFM with the Gram Sabha of the Panchayati Raj Institutions aims at strengthening decentralized forest governance objective. This would encourage association of committees or groups such as JFMCs/CFM/VPs, etc. as well as livelihood promotion groups like SHGs/ CIGs to plan for forest protection, conservation and enhancing livelihood based activities. Livelihood

activities are best addressed at cluster level/sub landscape level/federation of SHGs/CIGs. The government also proposed Provision of infrastructure and support for improved agricultural practices as well as other natural resource based activities like apiculture would ensure better income to these poor households. to provide legal back up to JFMCs, build capacity of local institutions to effectively protect, regenerate and manage forests. Community driven innovative management practices can further check Forest degradation.

9. CONCLUSION

According to several estimates, India has traditionally been characterized as a low forest cover - low deforestation (LFLD) country exposed to significant direct-human induced deforestation and degradation in past few decades (ISFR 2011; Ravindranath et al 2012). Consequently, India's forests harness a large potential for livelihood based activities for the forest dependent communities, thus bridging the gap between the poor and forest based market. With such a huge population depending on forest for subsistence livelihood, the strategies for controlling forest degradation need to be focused on reducing the dependence by creating alternative livelihood opportunities for the forest dependent communities, providing alternative technologies to reduce the gap in demand and supply of forest products and making the community adopt sustainable harvesting practices.

This provides unhindered opportunities for the poor to utilize the traditional knowledge in sustainable management of forest with the help of the forest department and the Government of India. Linking the two, REDD+, and alternative livelihood improvement activities will ultimately reduce pressure on forests producing an increase in forest cover in future.

Moreover the international negotiations on REDD+ under the UNFCCC from Bali to Durban, provided a nested approach for REDD+ implementation leading to performance based system in countries undertaking REDD+ readiness activities like India, where communities will be benefited through conservation of forest ecosystem, in turn improving their livelihood and simultaneously increasing the forest cover of the country. Although, India is partially ready for implementing REDD+ mechanism, but still the benefit sharing mechanism needs to be framed properly, in order to overcome the livelihood issues in REDD+ and to conserve the degrading forest cover.

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