SUSTAINABLE FOREST ECOSYSTEM MANAGEMENT:
A STRATEGY FOR INDIA
EXECUTIVE SUMMARY

There is an international consensus that the sustainable management of forest ecosystems contributes towards human well-being. The ecosystem services that forests provide meet people’s economic, cultural and spiritual needs at local, national and global levels.

India is among the top ten forested countries in the world. The total forest and tree cover in the country is over 78 million hectares, or 23.8% of the country’s geographical area. However, very dense forests (where the tree canopy density is greater than 70%) cover a mere 2.5%. The growing stock of India’s forests is about 58.46 m³/hectare, which is less than half the global average of 131 m³/hectare. Therefore, there is great potential to enhance the stocking and carbon storage value of India’s forests making a significant contribution towards climate change mitigation.

The key objectives of this strategy are to promote integrated and sustainable management of forest ecosystems, which, while enhancing their carbon value, maintain or improve other locally or globally important ecosystem services and, where appropriate, encourage their sustainable use to support local livelihoods. The strategy rests on the following main pillars:

- Adoption of a landscape approach for holistic land use planning, while focusing on forest ecosystem services, including their sustainable use to support local livelihoods
- Convergence with relevant ongoing initiatives and utilization of existing policy and legal spaces to the extent possible
- Development or adaptation of innovative forest management models to promote context-specific sustainable forest ecosystem management
- Integration of gender and equity concerns

The strategy considers forest lands, common lands and private lands in a landscape to develop an integrated and holistic plan to ensure sustained or enhanced supply of ecosystem services, including livelihood benefits from sustainable use. The focus on sustainable use to support local livelihoods is critical since well over half of India’s workforce is still engaged in the agriculture sector and – despite rapid progress in recent years – poverty continues to be a major challenge. Convergence with relevant ongoing initiatives and utilization of existing policy and legal spaces is likely to improve the odds of acceptance and adoption of this strategy by relevant stakeholder groups and enhance the possibility of its implementation on the ground. Developing or adapting innovative forest management models, tools and techniques from different parts of India as well as other countries will help bring national and international best practices to different local contexts.

The key suggestions for forest lands include: identification of sacrosanct forest areas; redefining the objective of forest management as optimizing a wide range of ecosystem services and their sustainable use to support local livelihoods; shifting the focus from “quantity” (forest area) to “quality” (growing stock, species richness, etc.); development of innovative models, tools and techniques; conducting a proper economic valuation of resources; experimenting with innovative approaches such as “payments for ecosystem services” and forest certification; involving local communities in forest management; conducting a comprehensive inventory of forest resources; and putting in place a robust monitoring and evaluation system. For common lands, key suggestions include: resource mapping and preservation; moving from “open access” to “common property” regimes; demand management; and partnering with panchayati raj institutions (PRIs) as well as watershed programs. For private lands, which are already meeting 89% of the country’s wood demand, key suggestions are: documenting existing models and identifying potential species; incentivizing farm and agro-forestry research and development; promoting cultivation of Non-Timber Forest Products (NTFPs); removing policy bottlenecks related to tree growing, harvest and transport; establishing market linkages; and converging with flagship government programs.

This paper provides a comprehensive strategy for promoting sustainable forest ecosystem management in India. Actions proposed under this strategy could contribute towards meeting the national voluntary target of reducing the emission intensity of India’s Gross Domestic Product (GDP) by 20-25% over 2005 levels by 2020.
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I INTRODUCTION

The concept of sustainability has a long history in organized forestry. The initial focus of forest management in several countries (including India) was on sustained yield of a limited set of goods and services, primarily timber. In recent decades, the range of goods and services for which sustainable yield is sought has vastly increased, with a focus on forest ecosystem services (see Box 1). Another important change is that forests are no longer viewed in isolation but as integral parts of dynamic landscapes.

These prominent ideas have evolved into concepts such as Sustainable Forest Management (SFM) and Ecosystem Approach (EA). Both these concepts show adoption of broad environmental and social goals for forest management. They also reflect an acceptance of the need for sustainable development, which was defined in the Brundtland Report as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987, p. 43).

The international understanding and consensus on SFM/EA was captured in a systematic manner for the first time in the Forest Principles\(^1\) agreed upon at The United Nations Conference on Environment and Development (UNCED) held at Rio de Janeiro in 1992. For example, Principle 2(b) states that “[f]orest resources and forest lands should be sustainably managed to meet the social, economic, ecological, cultural and spiritual needs of present and future generations”. This

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Box 1: Categories of ecosystem services

The *Millennium Ecosystem Assessment* has classified ecosystem services into the following broad categories along functional lines:

**Provisioning services**: These are products obtained from ecosystems, including food and fiber, fuel, genetic resources, biochemicals, natural medicines and pharmaceuticals, ornamental resources and fresh water.

**Regulating services**: These are benefits obtained from the regulation of ecosystem processes, including air quality maintenance, climate regulation, water regulation, erosion control, water purification and waste treatment, regulation of human diseases, biological control, pollination and storm protection.

**Cultural services**: These are non-material benefits obtained from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences, including cultural diversity, spiritual and religious values, knowledge systems, educational values, inspiration, aesthetic values, social relations, sense of place, cultural heritage values and recreation and ecotourism.

**Supporting services**: Supporting services are those that are necessary for the production of all other ecosystem services, including soil formation and retention, production of oxygen, nutrient cycling, water cycling and provisioning of habitat. These services differ from the other three services in that their impacts on people are either indirect or occur over a very long time.

*Source: MEA 2005*

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\(^{1}\) Non-legally binding authoritative statement of principles for a global consensus on the management, conservation and sustainable development of all types of forests.
understanding has been further refined over the past two decades through international forest policy dialogue within the Intergovernmental Panel on Forests (IPF), the Intergovernmental Forum on Forests (IFF) and the United Nations Forum on Forests (UNFF). It has also benefitted from the process of the development of a set of criteria and indicators for achieving sustainability in forest management, which has been supported by several international organizations including the Food and Agriculture Organization of the United Nations (FAO), the International Tropical Timber Organization (ITTO), the United Nations Environment Programme (UNEP) and other members of the Collaborative Partnership on Forests (CPF). The deliberations regarding forest certification, although outside formal intergovernmental dialogue, have also contributed towards enhancing collective understanding of sustainability issues in forestry.

While several definitions of SFM/EA have been attempted, some have gained wider acceptance and recognition. In case of SFM, the definition developed by the Ministerial Conference on the Protection of Forests in Europe has been adopted by FAO (Sayer and Maginnis 2005), defining SFM as:

*The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems.*

EA is closely aligned with “ecosystem management”, which refers to the concept of managing entire ecological units in an integral and holistic way. Originally, and especially in the United States, the term was used primarily for understanding and managing ecological processes (Sayer and Maginnis 2005). EA has a broader scope than ecosystem management since it includes relevant social processes as well. The concept of EA has been discussed and developed in the meetings related to the Convention on Biological Diversity (CBD). CBD defines EA as:

*[A] strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way…An ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompasses the essential structures, processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of many ecosystems.*

CBD has also developed a set of 12 principles (the “Malawi Principles”) of EA, which are listed in Box 2.

In both SFM and EA, the emphasis is on maintaining a sustained flow of bundles of ecosystem services that contribute towards human well-being. A document prepared by IUCN² has put it succinctly: “use them, but don’t lose them” (Pirot et al. 2000, p. ix).

While SFM and EA provide the conceptual underpinnings for forest management, context-specific operational guidance also needs to be developed. This Sustainable Forest Ecosystem Management strategy for India is an attempt in this direction.

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² International Union for Conservation of Nature and Natural Resources (The World Conservation Union).
Box 2: Malawi Principles of Ecosystem Approach

1. The objectives of management of land, water and living resources are a matter of societal choice.
2. Management should be decentralized to the lowest appropriate level.
3. Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.
4. Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should:
   (a) reduce those market distortions that adversely affect biological diversity;
   (b) align incentives to promote biodiversity conservation and sustainable use;
   (c) internalize costs and benefits in the given ecosystem to the extent feasible.
5. Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.
6. Ecosystems must be managed within the limits of their functioning.
7. The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.
8. Recognizing the varying temporal scales and lag effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.
9. Management must recognize that change is inevitable.
10. The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.
11. The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.
12. The ecosystem approach should involve all relevant sectors of society and scientific disciplines.


2 OBJECTIVES

The key objectives of this strategy are to promote integrated and sustainable management of forest ecosystems that enhances their carbon value, while enhancing or maintaining other locally or globally important ecosystem services and, where appropriate, promoting their sustainable use to support local livelihoods with an emphasis on the role of marginalized groups and women.

3 KEY ISSUES AND THREATS

India is among the top ten forested countries in the world with a total forest area\(^3\) of around 77 million hectares, or 23.4% of the country’s

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\(^3\) Forest area is the area recorded as a forest in Government records. It is also referred to as “recorded forest area”. The recorded forest area could be devoid of vegetation.
Forest cover consists of all lands more than one hectare in area with a tree canopy density of more than 10%, irrespective of ownership and legal status. Such lands may not necessarily be a recorded forest area. It also includes orchards, bamboo and palm.

Tree cover comprises tree patches outside the recorded forest area, exclusive of forest cover and less than the minimum mappable area (1 hectare).

Figure 1: Forest cover of India (FSI 2011)

geographical area. Actual forest cover\(^4\) – which is a better indicator than forest area – is also about 69.2 million hectares or 21.1% of the geographical area (see Figure 1). Additionally, estimates suggest the tree cover\(^5\) to be a little over 9 million hectares. Thus, the combined total of forest and tree cover in the country is over 78 million hectares, or 23.8% of the country’s geographical area (FSI 2011).

Forest and tree cover have been used as key indicators by India’s forestry sector for several

\(^4\) Forest cover consists of all lands more than one hectare in area with a tree canopy density of more than 10%, irrespective of ownership and legal status. Such lands may not necessarily be a recorded forest area. It also includes orchards, bamboo and palm.

\(^5\) Tree cover comprises tree patches outside the recorded forest area, exclusive of forest cover and less than the minimum mappable area (1 hectare).
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important indicator from climate change perspective) of India’s forests is 58.46 m³/hectare (FSI 2011), which is less than half the global average of 131 m³/hectare (FAO 2010). Similarly, the carbon stock in the living forest biomass carbon pool is barely over half the world average (FSI 2013). This indicates that there is a great potential to enhance the stocking and carbon storage value of India’s forests through sustainable management, which will make a significant contribution towards carbon sequestration for climate change mitigation.

Adoption of SFM/EA is especially important for India’s forest ecosystems due to their critical role in the country’s water and food security. India’s forests help maintain both river flows and groundwater aquifers. Hill forests, such as those in the Himalayas, feed India’s major rivers. The national policy-makers have now realized the

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For example, the key target under India’s National Forest Policy (1988) is to bring a minimum of one-third of the total land area of the country under forest or tree cover.

Based on various State of Forest Reports of the Forest Survey of India. Due to methodological and technological changes over the years, the data for different years is not always strictly comparable, though efforts to harmonize these data have been made, where appropriate, by the Forest Survey of India. However, it does not appear that these inconsistencies in data affect the broad trend that India’s forest cover has been stable over the past quarter of century or so.

40.82 tons/hectare in India as compared to the global average of 71.6 tons/hectare.
importance of watershed protection service provided by forest ecosystems. A Task Force constituted by the Planning Commission to look into issues related to hill areas noted:

[The Himalayan] States must be persuaded to emphasize on a development path that does not disturb the primary colours of this picture: white, blue, green and brown representing the precious natural resources of the [Indian Himalayan Region], namely the snow and water, forest, and land (Planning Commission and GBPIHED 2010, p. 10).

Forests also play an important role in maintaining groundwater aquifers, which are critical for Indian agriculture. Around 60% of irrigated agriculture in India depends on groundwater, which is being exploited at an unprecedented rate (c. 210 billion m$^3$ per annum). A study by the National Aeronautics and Space Administration showed that between 2002 and 2008, India lost about 109 km$^3$ of water leading to a decline in water table to the extent of 0.33 meters per annum (Planning Commission 2010; GoI and UNDP 2012).

The above discussion demonstrates the need for adopting SFM/EA for India’s forest ecosystems. However, in order to develop a strategy for moving towards SFM/EA, we need to first understand key threats and constraints facing India’s forests. The National Forest Commission’s report, which was published in 2006, lists eleven major and several other miscellaneous threats and constraints. While some such as macro demographic changes and insurgency are beyond the scope of this strategy paper, others such as forest degradation due to “development” pressures and unsustainable use, fires, invasive species and lack of proper inventory of forest resources could be addressed through concerted action. Some of these threats and constraints are briefly discussed in this section$^9$.

3.1 “Development” Imperative

There is considerable pressure on India’s land resources as the country supports around 17% of the world’s population on less than 2.5% of global land area. In order to support this large population, around 42% of the country’s geographical area has already been put under agriculture (DAC 2013). The remaining area, including forests, is also under tremendous pressure. In many places, forest lands have been fragmented due to expansion of agriculture or other developmental activities. In the Western Ghats, large tracts have been converted to monoculture plantations such as coffee and rubber (MoEF 2009). It is estimated that more than 45% of protected areas have public thoroughfares that divide them into smaller parts (NFC 2006).

As India’s economy grows rapidly, these “development” pressures on forests are likely to increase further. The Twelfth Five Year Plan notes:

...potential conflict arises because most of our mineral resources are in areas, which are forested and the effective exploitation of these resources calls for acquisition, which may disrupt some tribal communities (Planning Commission 2012b, p. 21).

Most of our coal resources and hydro potential are in ecologically sensitive areas and a successful resolution of these problems is critical if we are to be able to exploit our potential energy resources.

$^9$ This is an indicative rather than an exhaustive list.
The alternative is to either accept a much lower rate of growth, or rely even more than we already do on imported energy, which has implications for both the balance of payments and energy security (Planning Commission 2012b, p. 22).

3.2 Livelihood Dependence

A major reason for forest degradation is unsustainable use and over-exploitation. Apart from pressures from industrialization and urbanization, a sizeable proportion of the rural population depends on forests for meeting their subsistence requirements. These requirements are one of the reasons for low growing stock of forests in the country. Fuelwood and fodder are two key products which are extracted in substantial quantities from forests.

**Fuelwood:** It is estimated that 23% of the population using fuelwood obtains it from forests\(^\text{10}\). The forest lands supply around 27.15% of the total fuelwood consumption of 216.42 million tons per annum (FSI 2011). Apart from contributing to greenhouse gas emissions, fuelwood burning is a major source of indoor pollution in India. The World Health Organization estimates that a pollutant released indoors is one thousand times more likely to reach people’s lungs than a pollutant released outdoors. According to an estimate, about half a million women and children die each year from indoor air pollution in India (ICMR 2001).

**Grazing and Fodder:** India has nearly 530 million livestock (DAHDF 2011). It is estimated that as many as 38.49% of fodder-consuming livestock are partially or completely dependent on forests. As different types of livestock have different fodder requirements, the standard measure of Adult Cattle Units (ACUs) can provide a better picture. It has been estimated that 22.63% of ACUs in the

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\(^\text{10}\) 199.63 million out of 853.88 million.

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Photo I: Millions of people in India depend on fuelwood extracted from forests.
country are completely dependent on forests for fodder (FSI 2011). The National Forestry Action Programme (2000-2020) estimated that even 67% of the National Parks and 83% of the Sanctuaries were affected by grazing (MoEF 1999).

3.3 Forest Fires

Fires, especially anthropogenic ones, are a major threat to India’s forests. During 2010-11, as many as 13,898 fire incidents were recorded by the Forest Survey of India through remote sensing and reported to different State Forest Departments (FSI 2011). That is over 38 incidents per day! Apart from the air pollution (including release of CO₂) they cause, these fires often affect natural regeneration and are particularly damaging to certain species (such as ground nesting birds). It is estimated that 55% of the country’s forests are prone to fire and 70% of forests have no natural regeneration. Repeated and extensive fires, over a period, can even alter the character of a forest (e.g. from wet evergreen to semi evergreen) and affect its biodiversity value (NFC 2006). With climate change, the frequency as well as severity of forest fires is likely to increase (Bernier and Schoene 2009; Mukhopadhyay 2009).

3.4 Invasive Species

The invasive species have emerged as a major threat to India’s forests. The major invasive plant species include Lantana camara, Eupatorium odoratum, Eupatorium adenophorum, Parthenium hysterophorus, Ageratum conyzoides, Mikania micrantha, Prosopis juliflora and Cytisus scoparius. Invasive climbers such as Chromolaena and Mikania have over-run and strangulated native species in the Himalayas and Western Ghats. Aquatic invasive species such as Water Hyacinth (Eichhornia spp.) and Salvinia have choked several freshwater ecosystems, depriving native species of sunlight, oxygen and nutrients (MoEF 2008). While invasive grasses are not such a big problem as in some other countries, some invasive grass
species (e.g. Chloris barbata) have been reported from forests.

3.5 Climate Change

Climate change has emerged as a major threat to forest ecosystems. It is estimated that 40-70% forested grids in different states are considered vulnerable to climate change, which may lead to dying forests and loss of biodiversity (Planning Commission 2012b). The impact is likely to be unique to each state, with forests in some states being more vulnerable than others (MoEF 2010b). The Indian Network for Climate Change Assessment (INCCA) has carried out a detailed assessment of forests in four key regions, viz. (1) the Western Ghats, (2) the Himalayas, (3) the coastal regions and (4) the North-Eastern part of the country. After a detailed analysis, INCCA concluded that forest ecosystems in the Himalayan region are the most vulnerable, coastal and Western Ghats forests moderately vulnerable and forests in the North-Eastern region least vulnerable to climate change. Although the net primary productivity may increase in many forest areas due to enhanced CO₂ concentration, around 70% of the vegetation is likely to find itself less than optimally adapted to its existing location, making it more vulnerable to the adverse climatic conditions as well as to increased biotic stresses. This may have serious adverse impact on biodiversity in most forest biomes of the country (INCCA 2010).

4 STRATEGY

4.1 Key Elements

India has a well-developed policy and legal framework for the management of forests. The key policies in this regard are: (i) National Forest Policy, 1988; (ii) National Conservation Strategy and Policy Statement on Environment and Development, 1992; and (iii) National Environment Policy, 2006. The legislative framework is provided by a number of laws, the most important of which are: (i) Indian Forest Act, 1927; (ii) Wildlife (Protection) Act, 1972; (iii) Forest (Conservation) Act, 1980; (iv) Environment (Protection) Act, 1986; (v) Biological Diversity Act, 2002; and (vi) Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006.

Although there is a robust policy and legal framework for management of forest lands, sustainable forest ecosystem management requires a broader view for integrated management of forest resources (both goods and services), providing an incentive to implement REDD+12. This strategy is an attempt to facilitate this transition. The key elements of this strategy for sustainable forest ecosystem management are:

- Adoption of a landscape approach for holistic land use planning, while focusing on forest ecosystem services (including carbon sequestration and storage) including their sustainable use to support local livelihoods.
- Convergence with relevant ongoing initiatives and utilization of existing policy and legal spaces to the extent possible.
- Developing or adapting innovative forest management models (from India as well as other countries) to promote context-specific sustainable forest ecosystem management.
- Establishing a platform to support women and other marginalized groups to understand and engage with carbon sequestration

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12 REDD: Reducing Emissions from Deforestation and Forest Degradation.
programs, allowing them to gain skills and experience otherwise unobtainable.

4.1.1 Landscape Approach and Sustainable Use

A landscape can be defined as “a contiguous area...with a specific set of ecological, cultural and socio-economic characteristics distinct from its neighbours”\(^\text{13}\). A landscape approach focuses on large, connected geographic areas to fully recognize natural resource conditions and trends; natural and human influences; and opportunities for resource conservation, restoration and development. It seeks to identify important ecological values and patterns of environmental change that may not be evident when managing smaller, local land areas\(^\text{14}\).

In the context of this strategy, a landscape approach means considering forest lands, common lands and private lands together in order to develop an integrated and holistic plan that ensures a sustained or enhanced supply of ecosystem services, including livelihood benefits from sustainable use. Depending on the local context, the landscape may also include urban or peri-urban areas as well as the agriculture frontier. The focus on the landscape approach is also in line with the current national-level thinking, articulated in the mission strategy of the National Mission for a Green India\(^\text{15}\):

*The Mission will foster an integrated approach that treats forests and non-forest public lands as well as private lands simultaneously, in project units/sub-landscapes/sub-watersheds. Livelihood dependencies, for example firewood needs and livestock grazing, will be addressed using inter-sectoral convergence (e.g., livestock, forest, agriculture, rural development, and energy) (MoEF 2010b, p. G).*

The focus on sustainable use to support local livelihoods is critical in the Indian context considering that well over half (58.2%) of the country’s workforce is still engaged in the agriculture sector (DAC 2010) and – despite rapid progress in recent years – poverty continues to be a major challenge. According to the Planning Commission, as much as 29.8% of the total population and 33.8% of the rural people were living in poverty in 2010 (Planning Commission 2012a). Sustainable use is also one of the core themes of the Biological Diversity Act, 2002. The Act defines sustainable use as the “use of components of biological diversity in such manner and at such rate that does not lead to the long-term decline of the biological diversity thereby maintaining its potential to meet the needs and aspirations of present and future generations”. This definition could be easily adapted for other ecosystem services as well.

4.1.2 Convergence and Links to Existing Policy Framework

Convergence with relevant ongoing initiatives and utilization of existing policy and legal spaces is likely to improve the odds of acceptance and adoption of this strategy by relevant stakeholder groups and enhance the possibility of its implementation on the ground. It would also allow for the leveraging of additional resources and lead to more probable sustainability beyond the tenure of specific projects and programs. For example, convergence with activities under the Mahatma Gandhi National Rural Employment \(^\text{11}\) Source: http://assets.panda.org/downloads/p011landscapeapproach.pdf (accessed November 20\(^\text{th}\), 2012).


\(^\text{13}\) Popularly known as the Green India Mission or GIM.
Guarantee Act, 2005 (MGNREGA) and National Rural Livelihoods Mission (NRLM) would not only help in generating additional resources for sustainable forest ecosystem management, but also lead to the establishment of more robust people’s institutions. Such convergence is also envisaged under the National Mission for a Green India:

The Mission will add “value” to ongoing programs/schemes on “greening” being taken up by multiple agencies. Such value addition will come through a) technical inputs on species mix from climate adaptation/mitigation angle, b) improved policy regime to help multiple agencies plant, protect and manage forests and tree growth, and c) advisory services for benefits under REDD Plus/CDM and would include support in outcome-level monitoring (MoEF 2010b, p. 9).

The strategy for sustainable forest ecosystem management is in consonance with the comprehensive National Environment Policy issued by the Government of India in 2006 to “infuse a common approach” and to achieve “balance and harmony between economic, social and environmental needs of the country”. This policy has seven main objectives: (i) Conservation of Critical Environmental Resources; (ii) Intra-generational Equity: Livelihood Security for the Poor; (iii) Inter-generational Equity; (iv) Integration of Environmental Concerns in Economic and Social Development; (v) Efficiency in Environmental Resources Use; (vi) Environmental Governance; and (vii) Enhancement of Resources for Environmental Conservation. The policy also lays down a number of principles including inter alia the “public trust doctrine”, “precautionary approach”, “polluter pays”, “equity”, and “entities with incomparable values”. All of these objectives and principles are complementary to those of sustainable forest ecosystem management.

4.1.3 Innovative Forest Management Models

Developing or adapting innovative forest management models and best practices from different parts of India as well as other countries will help bring in national and international best practices to different local contexts. It will also aid in identifying critical gaps, which could be addressed through research, such as innovative silviculture models, sustainable Non-Timber Forest Product (NTFP) harvest methods and sustainable grazing techniques. Identifying such gaps will lead to a more focused line of research, allowing studies to be guided by what India urgently needs in its forestry sector. The need for such research can be understood from a recent publication of the Ministry of Environment and Forests (MoEF):

…very few attempts have been made for raising the quality and increasing the production of NTFP items, as year after year the total quantum collected invariably shows a downward trend…No systematic work has been done in assessing the potential of NTFPs. Even the utilization of forest produce by local communities for various purposes has not been properly studied and documented…Research on various aspects of NTFPs management generally has not covered utilization of products or commercial basis…(Kishwan et al. 2007).

4.1.4 Equity and Gender Issues

Considering varying nature of forest linkage and dependence patterns across different caste, class and gender groups, it is important to incorporate equity considerations into the strategy. A starting point for exploring these linkages and dependence patterns could be participatory analyses in selected landscapes. The analyses will seek to understand the relationships, power
dynamics, constraints and opportunities that affect different participants and their ability to engage in sustainable forest ecosystem management. It will especially look at women’s time burden issues, such as fuelwood collection, and identify ways to reduce the burden while improving engagement in forest management and other productive activities. Examples of possible solutions may include introduction of biodigesters, improved cook stoves, and communal wood collection. The results of the analyses will be used to mainstream equity and gender considerations.

### 4.2 Strategy Points

In the following pages, specific strategy points related to forest lands, common lands and private lands are discussed.

#### 4.2.1 Forest Lands

**4.2.1.1 Resource**

Nearly a quarter of India’s geographical area (23.4%) is classified as forest lands (called recorded forest area). These are mainly classified into reserved, protected and unclassed forests in accordance with the Indian Forest Act, 1927 (see Table 1).

Some forest lands are part of the country’s protected area network. At present, India has a network of 668 protected areas comprising 102 National Parks, 515 Sanctuaries, 47 Conservation Reserves and four Community Reserves (MoEF 2012).

**4.2.1.2 Sacrosanct Areas**

Due to increasing “development” pressures on forests, it is important to identify forest areas that provide high value ecosystem services and thus should be considered as sacrosanct. In these areas, mining or other ecologically damaging activities should not be permitted. The national policymakers have also emphasized this in the Twelfth Five Year Plan:

> There may be some areas of forests that we view as sacrosanct, such as special reserves and biodiversity hotspots, where no intrusion is allowed… (Planning Commission 2012b, p. 22).

**4.2.1.3 Objective of Forest Management**

The objective of the management of forest lands has to shift from maximizing a limited set of goods and services to optimizing a wider range of ecosystem services (such as carbon sequestration and carbon stock, biodiversity conservation, watershed protection, and landscape beauty and outdoor recreation). The sustainable use of these goods and services, where appropriate, can support local livelihoods for years to come. This is the thrust of the Twelfth Five Year Plan (2012-17). The following is the extract from the “Vision”

### Table 1: Classification of recorded forest area in India

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<th>Category</th>
<th>Area (Million Hectares)</th>
<th>Percentage of Recorded Forest Area</th>
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<tr>
<td>Reserved Forests</td>
<td>43.06</td>
<td>56%</td>
</tr>
<tr>
<td>Protected Forests</td>
<td>20.62</td>
<td>26.8%</td>
</tr>
<tr>
<td>Unclassed Forests</td>
<td>13.27</td>
<td>17.2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>76.95</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

*Source: FSI 2009*
Managing Environment, Forests, Wildlife and challenges due to Climate Change for faster and equitable growth, where ecological security for sustainability and inclusiveness is restored, equity in access to all environmental goods and ecosystem services is assured through institutionalisation of people’s participation (Planning Commission 2012b, p. 202).

This new thinking is also reflected in reports of expert panels, such as the recent report on Western Ghats\(^\text{16}\).

This broader objective should guide the preparation of all new working plans\(^\text{17}\) in the country. The draft “National Working Plan Code” developed by the Forest Research Institute (FRI 2012) provides ample guidance and scope for developing holistic and integrated working plans for all forest divisions in the country. It states that forest management planning “must provide for sustainable management of forest…encompassing the ecological (environmental), economic (production) and social (including cultural) dimensions” (FRI 2012, p. 4). It also provides for mandatory “working circles” for management of important NTFPs, Biodiversity Conservation and Development, Wildlife Management, and Water Resources Management (FRI 2012). Non-extractive sustainable use, such as ecotourism, needs to be promoted - wherever feasible. Ecotourism and participatory eco-development have been identified as key goals under the Twelfth Five Year Plan (Planning Commission 2012b). Alongside change in the objective of forest management, the mandate of all Forest Development Corporations in the country should also be reviewed and aligned with the new objective.

While this strategy paper explicitly supports carbon sequestration and maintenance or enhancement of carbon stocks, it is pertinent to clarify that carbon can only be one of several forest ecosystem services in the Indian context. This is also the official position of the Government of India:

…enhancing the quantum of forest ecosystem services that flow to the local communities. The services include fuelwood, timber, fodder, NTFP and also carbon sequestration. It is underlined that in the Indian context, carbon service from forest and plantations is one of the co-benefits and not the main or sole benefit\(^\text{18}\).

4.2.1.4 Landscape Perspective

While broadening the forest management objective will certainly be a step in the right direction, it may not be enough to address some issues that require an even broader landscape perspective (e.g. management of fugitive resources such as migratory wildlife and stream flow).

From the perspective of forest ecosystem health and biodiversity, the establishment of corridors to link protected areas (to ensure migration/gene flow and also to respond to potential range shifts due to climate change) is an essential step. These could be established using available legal and

\(^\text{16}\) Report of the Western Ghats Ecology Expert Panel submitted to MoEF in 2011. The panel has suggested designation of the entire Western Ghats as an Ecologically Sensitive Area and assigned three levels of ecological sensitivity to different regions of it.

\(^\text{17}\) Forest management plans at the Forest Division level, usually made for ten years.

\(^\text{18}\) Source: “India: Views on implementing COP decisions on ‘Reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries’ (REDD-plus)” (emphasis in original), available at http://unfccc.int (accessed April 1st, 2013).
policy spaces such as “Conservation Reserves” under The Wildlife (Protection) Amendment Act, 2002 (section 36A); “Biodiversity Heritage Sites” under The Biological Diversity Act, 2002 (section 37); “Eco-sensitive Zone” and “Coastal Regulation Zone” under The Environment (Protection) Act, 1986 (amended 1991) (section 3(2)(v)); and “Critical Wildlife Habitat” under The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (section 4(2)). The importance of establishing such corridors can be illustrated through the case of Asiatic Elephants. Since the 1960s, their geographic range has shrunk by as much as 70% (MoEF 2011) and migratory corridors are critical for their long-term survival.

It is also important to recognize that there are considerable biodiversity/other ecosystem services values outside lands formally declared as protected areas19. For example, of 463 Important Bird Areas (IBAs) identified in the country, as many as 199 (43%) are not officially protected (NFC 2006). The new draft Working Plan Code also provides ample scope to look beyond the administrative boundaries. The following extract from the Code on water resources management illustrates this point:

*The forests are also sources of water (surface, sub-surface and ground). It is desirable to have forest management practices dovetailed with the principles of watershed based development approach especially in the source areas of water. Such areas should have restrictions on tree felling and also there should be operations to improve the water regimes and natural regeneration. That is why special provisions should be made in the working plan to sustain water resources and livelihood issues of the people in fringe forest areas (FRI 2012, pp. 5-6).*

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### 4.2.1.5 New Silviculture Focus: Timber to Multiple Products and Services

As the objectives of forest management change and a broader perspective on resource management is taken, new silviculture and management models will be needed. The focus has traditionally been on timber. This focus needs to be broadened and new models and techniques developed, the reasons for which are discussed in this section. The government forest lands are presently supplying only around 6.5% (3.175 million m$^3$) of the total wood consumed in the country (c. 48 million m$^3$) (FSI 2011). Although the contribution of government forest lands to total wood supply is relatively small, timber operations put considerable demands on time and energy of both planners and field managers. Further, timber operations sometimes adversely impact the flow of other ecosystem services as well as local livelihoods at the forest management unit level. Therefore, all commercial timber operations should be reviewed and their impact on other ecosystem services and local livelihoods assessed. In cases where the costs (economic, not just financial) outweigh the benefits, such commercial operations should cease. Similar exercises could also be undertaken for commercially-important NTFPs extracted on a large scale, such as tendu leaves (*Diospyros melanoxylon*), pine resin (*Pinus roxburghii*) and sal seeds (*Shorea robusta*). While deciding on such commercial operations, potential alternative sources of such forest products should also be considered. It is pertinent to mention here that there is already a ban on “green felling” in several states and a ban on felling above a particular altitude (1,000 metres). This is also very much in accordance with the National Forest Policy, 1988 as it evident from the following extracts from the policy document:
The principal aim of Forest Policy must be to ensure environmental stability and maintenance of ecological balance including atmospheric equilibrium which are vital for sustenance of all life forms, human, animal and plant. The derivation of direct economic benefit must be subordinated to this principal aim (Paragraph 2.2 of the Policy, emphasis added).

The life of tribals and other poor living within and near forests revolves around forests. The rights and concessions enjoyed by them should be fully protected. Their domestic requirements of fuelwood, fodder, minor forest produce and construction timber should be the first charge on forest produce (Paragraph 4.3.4.3 of the Policy, emphasis added).

As far as possible, a forest-based industry should raise the raw material needed for meeting its own requirements, preferably by establishment of a direct relationship between the factory and the individuals who can grow the raw material by supporting the individuals with inputs including credit, constant technical advice and finally harvesting and transport services…The practice of supply of forest produce to industry at concessional prices should cease. Industry should be encouraged to use alternative raw materials. Import of wood and wood products should be liberalized (Paragraph 4.9 of the Policy).

4.2.1.6 New Silviculture Focus: Quantity to Quality

For several decades, India has focused on increasing forest/tree cover by establishing new plantations. The idea of a minimum one-third area under forest/tree cover dates back to the National Forest Policy of 1952. In order to achieve this objective, large-scale plantations have been established on both forest and non-forest lands. Just between 1985 and 1992 – when there was a policy thrust on new plantations after the establishment of the National Wastelands Development Board – no less than 12 million hectares of new plantations were established in the country (MoEF 1998). Now the focus needs to shift from “quantity” (forest area) to “quality” (growing stock, species richness, etc.). This has also been acknowledged by the Government of India in its documents related to the Eleventh Five Year Plan:

The target of 33% forest and tree cover reflects the tree component without accounting for other vibrant non-tree natural biomes like grasslands…Further recognition of biodiversity characteristics and ecological services rendered by habitats like grasslands, natural desert ecosystems, alpine, and riparian habitats suggests that several biomes, even if devoid of tree component, can be recognized as ‘green cover’ and accounted so (Planning Commission 2007, Paragraph 9.1.18).

There is a need to change our mindset away from a ‘quantity’ focus towards a ‘quality’ focus. We should not merely focus on increasing the area under forest and tree cover, as we have traditionally done, but instead focus on increasing the quality of our forest and tree cover. This would mean greater emphasis on increasing the density of our existing forests, regenerating our degraded forest land, and eco-restoration of our scrub and grass land, mangroves, wetlands, and other ecological assets (Planning Commission 2010, Paragraph 22.4). The mission strategy of the National Mission for a Green India articulates the new policy thrust clearly:

The scope of greening will go beyond trees and plantations to encompass both protection and restoration. Emphasis will be placed on restoration of degraded ecosystems and habitat diversity,
for example, grassland and pastures (more so in arid/semi-arid regions), mangroves, wetlands and other critical ecosystems. The greening will not only strive to restore degraded forests, but will also contribute in the protection and enhancement of forests with relatively dense forest cover (MoEF 2010b, p. G).

An important element of improving quality should be interventions for management of invasive species. Protocols for controllegation of all major invasive species need to be developed.

4.2.1.7 Innovative Models, Tools and Techniques with a Focus on Sustainable Grazing and NTFP Management

The proposed new silviculture focus requires development or adaptation of innovative forest management models, tools and techniques for holistic and integrated management of forests. There is already a lot of innovation available at the field level in different states, particularly in various forestry sector projects implemented by the State Forest Departments. As a first step, these innovative models, tools and techniques need to be identified, collated and documented. In addition, effort should also be directed towards developing new models, tools and techniques to address new challenges of integrated management where pre-existing methods, tools and techniques do not exist and/or cannot be easily adapted. These need to be developed for both extractive (e.g. NTFPs) and non-extractive (e.g. ecotourism) use. For example, sustainable harvest protocols need to be developed for different NTFPs. Similarly, carrying capacity for livestock in different forest types needs to be assessed and sustainable grazing models (such as rotational grazing) need to be developed. Depending on the local context, unproductive cattle20 and transhumance may also need to be incorporated in the models.

Sustainable NTFP management and promotion of sustainable grazing practices have been identified as important thrust areas in the Twelfth Five Year Plan from the perspective of both sustainable forest ecosystem management as well as livelihoods of local communities. The following extracts from the plan indicates the national emphasis on these issues:

To develop the NTFP sector in a holistic way and coordinate the various activities for sustainable management and livelihood, an autonomous agency needs to be set up with branches in all states. For the overall management of NTFP resource including conservation and development of an estimated 6 lakh ha as well as value addition and marketing support, a new scheme for sustainable livelihoods through NTFP management including bamboo needs to be formulated (Planning Commission 2012b, p. 214).

There is an urgent need to focus on pasture management and formulation of grazing policy at the national level which will enhance the livelihood, nutrition and quality of life of all fringe forest dwellers. A new scheme on rangeland and silvi-pasture management for rehabilitation and productivity enhancement of rangelands, traditional grasslands on common/revenue lands around forest areas is required. Infrastructural and institutional mechanism for fodder storage, value addition facilities, maintenance of germ-plasm banks and nurseries is required to be developed during the Twelfth Plan period (Planning Commission 2012b, p. 214).

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20 For example, Forest Department of Himachal Pradesh runs Gausodans for unproductive cattle. There is also a need to formulate clear policy on inter-state movement of livestock.
Another important area of intervention is enhancement of supply of fuelwood (e.g. through farm/agro-forestry and energy plantations) and moderation of demand though introduction of improved cook-stoves and alternative fuels.

After these methods, tools and techniques are identified, developed or adapted, they need to be widely shared with relevant stakeholders through different platforms. Subsequently, their capacity in using these methods, tools and techniques also needs to be developed. It will be useful to develop thumb rules (e.g. no tree felling above a particular slope), wherever appropriate.

4.2.1.8 Economic Valuation

Alongside development of innovative models, tools and techniques, another issue that needs immediate attention is valuation. While listing of various biological and other resources in an area is an important first step, there is a need to move beyond mere listing to proper economic valuation of the available resources. This will help in preparing appropriate plans for management of different ecosystem services. The recent study by MoEF, in collaboration with The Economics of Ecosystems and Biodiversity (TEEB), is a step in this direction. Some attempts at valuation of forests and forest ecosystem services have also been made at the state level (e.g. in Himachal Pradesh). Such valuation studies could also feed into the process of developing “Net Present Value (NPV)” estimates by the Compensatory Afforestation Fund Management and Planning Authority (CAMPA), which are used to collect compensation for diversion of forest lands for non-forest purposes21.

4.2.1.9 Payments for Ecosystem Services

An issue closely linked to economic valuation is “payments for ecosystem services (PES)”. There is rich experience of the PES approach working in several countries22. The idea has been explored in the Indian context as well, especially at the state level. For example, the Himalayan Chief Ministers’ Conclave held at Shimla in 2009 demanded payment for ecosystem services that the Himalayan states are providing to the rest of the country:

The Conclave agreed to pursue the common agenda to protect, conserve and enhance forests and other natural resources of the state. They will work to ensure that financial incentives are provided for natural resources, which capture the cost of ecosystem services, carbon sequestration as well as land and livelihood opportunities. They prioritised the need for the 13th Finance Commission to enunciate the principle of payment to Himalayan states for the protection, preservation and enhancement of forests and other natural resources and desired that the Commission should provide adequate and ample resources for sustainable development (Extract from the Shimla Declaration on Sustainable Himalayan Development, Shimla, October 30th, 2009).

The basic principle of PES is also reflected in the recommendations of the Twelfth and Thirteenth Finance Commissions (2005-10 and 2010-15, respectively)23. They have recommended payments to different states in proportion to their forest area. The forest payments were first provided as grants to the states to maintain forest

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21 It is pertinent to mention here that the rate of diversion of forestlands for non-forestry purposes fell from around 165,000 hectares per annum (average for 25 years from 1951-52 to 1975-76) to approximately 36,300 hectares per annum after the enactment of the Forest (Conservation) Act, 1980 (MoEF 2012).

22 See, for example, Landell-Mills and Porras 2002.

23 The Finance Commission defines financial relations between the center and states.
areas and subsequently as compensation for the economic losses emerging from maintaining such areas. In both cases, the payments were in addition to the routine forestry allocations and were packaged as incentives to the state governments to maintain/enhance forest cover. The following extract from the report of the Thirteenth Finance Commission describes the rationale for the INR 5,000 crore (c. USD 1 billion) “Forest Grant” recommended by it:

Our environmental grants both reward past actions and incentivise future actions. The forest grant that we recommend is essentially a reward for contributing to the ecology and bio-diversity of India, as well as a compensation to states for the opportunity loss on account of keeping areas under forest (Thirteenth Finance Commission 2009, p. 37)

The Twelfth Five Year Plan has suggested an Environmental Performance Index based on 16 variables (out of which four relate to forestry) for providing incentive payments to states and union territories through budgetary allocations (Planning Commission 2012b).

4.2.1.10 Forest Certification

A market-based mechanism that could help in promoting sustainable forest ecosystem management in the country is forest certification. Since its launch in the early 1990s, forest certification has grown from a concept to a major program in the international forestry sector. While Forest Stewardship Council (FSC) is the most prominent international player, several alternative forest certification initiatives also exist (Saigal and Vira 2009). There is a growing acceptance of the concept of forest certification in India. In September 2010, the Forest Certification Council of India was registered as a Trust. The latest available Annual Report of MoEF notes:

Certification and Eco-labelling are the new mantras to enhance the product positioning for a premium price on one hand and ensuring better forest management practices on the other hand (MoEF 2012, p.33).

4.2.1.11 Focus on Local Communities and Rural Livelihoods

In most human-dominated landscapes (i.e. most of India), involvement of local communities, especially women, will be the key to success of the management interventions. It can be an effective and socially-just way of addressing issues related to forest protection, including forest fires. The national forest policy emphasizes the need to create “a massive people’s movement with the involvement of women” (Paragraph 2.1) to achieve the policy objectives. This is also a key strategy of the National Mission for a Green India:

Local communities will be required to play a key role in project governance and implementation. The Mission will bring primacy to Gram Sabha as an overarching institution to oversee Mission implementation at the village level. The committees set up by the Gram Sabha, including revamped JFMCs, CFM groups, Van Panchayats, Committees set up under Forest Rights Act; Biodiversity Management Committees etc., will be strengthened as the primary institutions on the ground for nested decentralized forest governance in rural areas. Similarly in the schedule VI

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25 1 crore = 10 million.
areas, the traditional village level institution/village councils will be supported. Likewise, the Mission will support revamping/strengthening of the Forest Development Agencies to support the field institutions (MoEF 2010b).

There are a number of existing policy and legal spaces that could be used for meaningful involvement of local communities, such as declaration of “Village Forests” under the Indian Forest Act, 1927 (section 28); declaration and management of “Community Reserves” under the Wildlife (Protection) Amendment Act, 2002 (section 36C); and constitution of “Biodiversity Management Committees” under the Biological Diversity Act, 2002 (section 41). However, two initiatives are particularly noteworthy - Joint Forest Management (JFM) and Community Tenure Rights under The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006. The strategy with respect to these two initiatives is discussed separately.

4.2.1.12 Joint Forest Management

The JFM program of India is one of the most ambitious community forestry programs in the world. Under JFM, the State Forest Departments and local communities jointly manage specified forest areas adjoining villages and share responsibilities as well as benefits from forest management26. The program formally started in 199027 and it has now spread to millions of hectares of forest lands28. The JFM program has been supported by various externally-assisted projects as well as by the central government through the National Afforestation Programme. It is also a major focus of the National Mission for a Green India. Given the extensive spread of the JFM program, even a small improvement in its effectiveness can lead to significant environmental and social benefits. At present, the key issue in the JFM program is establishment of effective links between JFM Committees (JFMCs) and Panchayati Raj Institutions (PRIs). This is also the current national approach as is evident from the Twelfth Five Year Plan and the National Mission for a Green India.

The rationale for linkages between JFMCs and PRIs is that The Constitution (Seventy-third) Amendment Act, 1992 and The Panchayats (Extension to Scheduled Areas) Act, 1996 have devolved extensive powers to PRIs for making plans and implementation of schemes for economic development and social justice. In essence, these laws aim at establishing PRIs as institutions of local self-government and Gram Sabha as the base of democracy. The Schedule XI of the Constitution lists 29 subjects with respect to which panchayats are to prepare and implement plans for economic development and social justice for the area under their jurisdiction. Some of the key subjects of relevance to JFM that have been devolved to PRIs include: (i) social forestry and farm forestry; (ii) minor forest produce; (iii) fuel and fodder; (iv) welfare of the weaker sections, and in particular, of the SCs and STs; and (v) land improvement, implementation of land reforms, land consolidation and soil conservation. In addition, the Panchayats (Extension to the Scheduled Areas) Act, 1996 makes it mandatory for the state governments to ensure that the PRIs at the appropriate level and the Gram Sabha are inter alia endowed with the ownership of minor forest produce.

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26 Sometimes referred to as “care & share”.

27 However, there were some pre-existing local initiatives such as Arabari and Sukhomajri. The first JFM resolution of Odisha also predated the JFM circular of MoEF.

28 According to an estimate, there are over 100,000 JFMCs protecting/managing around 22 million hectares of forest lands (MoEF and WII 2006).
Although some commentators have expressed concern regarding the danger of politicization of JFMCs if these are linked to PRIs, such a linkage could yield several benefits such as integration of JFM micro plans with the broader *panchayat* level plans (including those related to the MGNREGA) for which significant amount of development funds are available at the *panchayat* level. It will also help in better coordination with the Biodiversity Management Committees established under the Biological Diversity Act, 2002. However, the key challenge in establishing effective linkages between JFMCs and *panchayats* is the mismatch in their boundaries. The *panchayats* usually have a much larger area under their jurisdiction. Some states have already tried to address this issue and the experience of such states needs to be carefully studied in order to learn what the best practices are. For example, the most recent JFM resolution of Odisha (2011) states that the Executive Committee of the JFMC (called Vana Surakhya Samiti) will function as a sub-committee of the *Palli Sabha* (hamlet-level Gram Sabha).

The National Mission for a Green India has suggested the following process for establishing linkages between JFMCs and PRIs:

> The JFMC will set up by Gram Sabha [sic], its constitution and processes need to be in tune with the provisions as laid out in the State Panchayat and PESA legislation. The JFMC, as a committee of the Gram Sabha, must be given power to protect and manage as well as derive benefits from forests. The Mission will examine provisions of the Indian Forest Act to provide power of a forest officer to such a committee. Provisions in the Panchayat Raj legislations in the States would need to acknowledge the role of JFMC as a committee of the Gram Sabha.

Silvicultural management of the area assigned to JFMC must be as per the plan approved by the

Photo 3: Forest-PLUS team members interacting with a JFM group in Himachal Pradesh. The JFM program of India is one of the most ambitious community forestry programs in the world.
 Gram Sabha, following the technical approval by the Forest Department.

Forest Department’s role would be to provide demand-based support to the Gram Sabha and its mandated committees to strengthen decentralized forest governance leading to sustainable management of the forests.

The FDA at the district/division level will be chaired by the elected representative, [sic] such as the Zila Parishad president which would help in program convergence with the Panchayati Raj institutions... (MoEF 2010b, pp. 27-28).

4.2.1.13 Forest Rights Act

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 is an important legal initiative to vest the forest rights and occupation in forest land in forest-dwelling Scheduled Tribes and Other Traditional Forest Dwellers and to address the “historical injustice” as many of them have been residing in such forests for generations but whose rights could not be recorded.

While ensuring livelihood and food security of forest-dwelling Scheduled Tribes and Other Traditional Forest Dwellers, the Act also mentions the responsibilities and authority for sustainable use, conservation of biodiversity and maintenance of ecological balance.

The relevance of this Act for sustainable forest ecosystem management can be gauged from the fact that up to March 2013 as many as 3.25 million claims had been filed and over 1.28 million land titles distributed. Available data from 14 states indicated that nearly 2 million hectares of forest land had been distributed. It is pertinent to mention that most of the claims and titles were in the individual category and there was relatively less progress regarding community rights29.

The key strategy for this Act should be promotion of community tenure rights and sustainable management of lands for which rights have already been vested in forest-dwelling Scheduled Tribes and Other Traditional Forest Dwellers. An attempt should also be made to harmonise community tenure rights granted under the Act with the JFM program. In fact, a high-level committee constituted jointly by MoEF and the Ministry of Tribal Affairs recommended that all JFM areas should be managed as community resources under the section 3(1)(i) of The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (MoEF and MoTA 2010). The recently amended rules (September, 2012) provide considerable powers to Gram Sabha (village council) for NTFP management, value addition and marketing. These could form the basis for discussion with the local communities and Forest Department officials on sustainable NTFP management issues.

4.2.1.14 Inventory for Carbon and Other Ecosystem Services

To make effective plans and monitor progress, baselines are needed. Although India has a robust system of forest inventory and mapping, so far it has largely focused on trees, particularly timber. For SFM/EA, we presently lack a comprehensive inventory of forest resources, which is something we desperately need. As an example, only 70% of the country’s land area has been surveyed (MoEF 2009). The inventory effort

needs to move beyond timber species to cover a wider set of flora and fauna. Information related to ecosystem services such as carbon stock, water tables and stream flow also needs to be recorded. Biological and other resources of particular value/importance to the local communities (economic or otherwise, including social/cultural value) should also be assessed using appropriate methods. Use of modern techniques such as GPS/remote sensing should be integrated into the inventory process. Information collected in different forest divisions should feed into the national forest inventory.

The proposed widening of the scope of the forest inventory process is in line with the guidelines in the draft National Working Plan Code currently under discussion (see Paragraphs 20 and 24 of the draft code). This need is also reflected in the Twelfth Five Year Plan, which stresses that environment management in the country should be based on “Data and facts”, “Analytics and modeling” and “Indexing and thresholding” (Planning Commission 2012b, p. 208). This will require coordination between the State Forest Departments and other relevant government departments and agencies.

Existing policy and legal spaces, such as the Biodiversity Registers being developed by the Biodiversity Management Committees (as per the provisions of the Biological Diversity Act, 2002), should be utilized where appropriate. However, one of the challenges that needs to be addressed is the acute shortage of appropriately trained personnel such as resource economists and taxonomists.

4.2.1.15 Monitoring and Evaluation

There is a common phrase “what gets measured gets done”. This holds for sustainable forest ecosystem management. Regular monitoring (both internal and independent) is the key to successful sustainable forest ecosystem management models introduced in different landscapes. The Forest Survey of India is doing an excellent job in monitoring forest cover and its change in the country. The value of its monitoring could be enhanced further if data is broken down for forest and non-forest lands and provided forest division wise. This will require digitization of boundaries of all forest lands, a task that should be taken up on a priority basis. The Forest Survey of India has now moved beyond forest cover and has started monitoring other parameters such as growing stock and carbon stock. Monitoring needs to move further and encompass a range of ecosystem services. This will require development of new monitoring tools and methods. Available international experience as well as modern technology should be utilized for this purpose. The criteria and indicators developed under the SFM process (e.g. Bhopal India Process), and those developed for forest certification could also be adopted after suitable modifications.

The Twelfth Five Year Plan places considerable emphasis on monitoring and evaluation and has identified 13 targets for the environment, forestry and wildlife sector (see Box 3). A National Forestry Information System is also proposed (Planning Commission 2012b).

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30 According to section 41 (1) of the Biological Diversity Act, 2002 “[e]very local body shall constitute a Biodiversity Management Committee within its area for the purpose of promoting conservation, sustainable use and documentation of biological diversity including preservation of habitats, conservation of land races, folk varieties and cultivars, domesticated stocks and breeds of animals and microorganisms and chronicling knowledge relating to biological diversity”.

31 The Government of India has also recognized the problem and initiated several initiatives such as the All India Coordinated Project on Capacity Building in Taxonomy (AICOPTAX) to address it (MoEF 2010a).
Box 3: Targets for the Twelfth Five Year Plan

Environment and Climate Change
1. Assess and remediate 12 identified contaminated sites (hazardous chemicals and wastes) with potential for ground water contamination by 2017.
2. Clean 80 per cent of critically polluted stretches in rivers by 2017 and 100 per cent by 2020.
3. States to meet NAAQS in urban areas by 2017.
4. To reduce emission intensity of our GDP in line with the target of 20 to 25 percent reduction over 2005 levels by 2020.

Forests and Livelihood
5. Greening 5 million ha under Green India Mission including 1.5 million ha of degraded lands, afforestation and ecorestoration of 0.9 million ha of ecologically sensitive areas.
6. Technology-based monitoring of forest cover, biodiversity and growing stock including change-monitoring on periodical basis through dedicated satellite by 2017 and establishment of open web-based National Forestry and Environmental Information system for research and public accessibility by 2015.
8. Establish forestry seed bank in forest circles and Model Nursery in every district with information on public portal by 2014.

Wildlife, Ecotourism and Animal Welfare
9. Twenty per cent of veterinary professionals in the country will be trained in treating wildlife.
10. Integrated Ecotourism District Plans covering 10 per cent of all potential Protected Areas (PAs) by 2017.
11. Promoting participation of private sector, civil societies, NGOs and philanthropists in animal welfare.

Ecosystem and Biodiversity
12. Restore 0.1 million ha of wetlands/inland lakes/water bodies by 2017.
13. Mapping and preparation of biodiversity management plans for deserts (both cold and arid), coastal areas, important coral zones, wetlands, mangroves and so on to be completed by 2017.

Source: Planning Commission 2012b, p. 209

4.2.1.16 Resource Mobilization through Convergence

The implementation of sustainable forest ecosystem management models will require resources - human as well as financial. In addition to regular government schemes, in states having special forestry sector projects, possibility of support through these projects could be explored. A promising source of resources is CAMPA. Various user agencies pay towards compensatory afforestation, additional
compensatory afforestation, penal compensatory afforestation, NPV, Catchment Area Treatment Plan or any money for compliance of conditions stipulated by the Central Government while according approval under the provisions of the Forest (Conservation) Act, 1980. The total corpus with CAMPA exceeds INR 25,000 crores (c. USD five billion). The significance of this corpus could be appreciated by comparing it with the annual expenditure for forestry and wildlife by the central government, which averaged only about INR 887.6 crores per year during the Eleventh Five Year Plan (2007-12) (Planning Commission 2012b). The tremendous scope for the utilization of CAMPA funds for promoting sustainable forest ecosystem management becomes clear if one looks at the objectives that CAMPA seeks to promote:

a) conservation, protection, regeneration and management of existing natural forests

b) conservation, protection and management of wildlife and its habitat within and outside protected areas including the consolidation of the protected areas

c) compensatory afforestation

d) environmental services, which include-

I. provision of goods such as wood, non-timber forest products, fuel, fodder and water, and provision of services such as grazing, tourism, wildlife protection and life support

II. regulating services such as climate regulation, disease control, flood moderation, detoxification, carbon sequestration and health of soils, air and water regimes

III. non-material benefits obtained from ecosystems, spiritual, recreational, aesthetic, inspirational, educational and symbolic

IV. supporting such other services necessary for the production of ecosystem services, biodiversity, nutrient cycling and primary production

e) research, training and capacity building.

For livelihood enhancement in forest-fringe villages (as an end in itself to address poverty and as a strategy to reduce pressure on forests or to create a stake in sustainable management), convergence with flagship government schemes such as MGNREGA and NRLM should be attempted to the extent possible to promote sustainable livelihoods.

4.2.2 Common Lands

4.2.2.1 Extent of Common Lands and People’s Dependence

Common lands are types of common pool resources that are described in the academic literature in terms of degree of excludability and...
rivalry (subtractability) (see, for example, Ostrom et al. 1994). Common pool resources are defined as “a class of resources for which exclusion is difficult and joint use involves subtractability” (Berkes and Farvar 1989, p. 7). These resources can be managed under a variety of property regimes, such as state, private, or common property, or no property rights may be recognized (res nullius or open access) (Bromley 1992).

In the Indian context, the National Sample Survey Organisation (NSSO) has provided a definition of common property resources: “Resources accessible to and collectively owned\ managed by an identifiable community and on which no individual has exclusive property rights are called common property resources” (NSSO 1999, p. 4).

The NSSO has estimated that common property land resources constitute 15% of the country’s geographical area (NSSO 1999). The breakdown of the common property land resources is as follows:

Community pastures and grazing grounds: 3.45%
Village forests and woodlots: 2.40%
Other: 9.15%

The NSSO took a de jure approach for the estimation of the extent of common property land resources and excluded all government forests as well as revenue lands. As many revenue lands are de facto common lands, the true extent of non-forest common lands is likely to be higher.

In many states these lands are important sources of fuelwood and fodder, especially for the poor. In fact, fuelwood and fodder are the top two products (by value) that are collected by rural households from these lands (NSSO 1999). The NSSO report also notes that “[t]here is evidence indicating a rapid decline in CPRs, both in size and productivity… the area of CPR land in rural India is declining at a quinquennial rate of 1.9% (NSSO 1999, p. 24).

4.2.2.2 Resource Mapping

In order to plan effectively, it is vital to understand the true extent of common lands, their availability and their status. For example, a government plan to take up biofuel plantations on common lands was developed a few years back and 11 potential districts were identified where official records indicated that 729,312 hectares of “culturable wastelands”37 were available. However, when the District Collectors were asked to identify blocks for biofuel plantations, only 40,495 hectares (5.55%) could be identified38.

4.2.2.3 Resource Preservation

As common lands are important complementary sources of fuelwood and fodder, they have the potential to considerably reduce pressure on forest lands for subsistence products. Therefore, it is important that the area of common lands is preserved. Unfortunately, over the years there has been a steady decline in the area of common lands due to their privatization – legal as well as illegal (encroachment). This privatization often hits the poorest the hardest since they lack the resources (such as adequate agriculture land) to fall back upon. The privatization of common lands (especially encroachment) needs to be discouraged through appropriate incentives and

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37 A category under the land use classification, usually de facto common lands.
38 Progress Report of Biofuel Authority, Rajasthan, June 2009.
disincentives. This is also the spirit of a Supreme Court judgment delivered in January 2011:

Before parting with this case we give directions to all the State Governments in the country that they should prepare schemes for eviction of illegal/unauthorized occupants of Gram Sabha/Gram Panchayat/Paramboke/Shamlat land and these must be restored to the Gram Sabha/Gram Panchayat for the common use of villagers of the village (Judgment in CIVIL APPEAL NO.1132/2011 @ SLP© No.3109/2011, Paragraph 22).

4.2.2.4 Control of Unsustainable Use and Over-Exploitation

Many common lands are degrading due to unsustainable use and over-exploitation. They show classic features of “the tragedy of the commons” (see Hardin 1968). In many areas, traditional institutional structures that promoted sustainable management of common pool resources have broken down. There is an urgent need to establish institutions (used in a broader sense than organizations) to move common lands from the “open access” to “common property” category. This is also one of the recommendations of the Sub-group (VI) of the Committee on Agrarian Relations and Unfinished Task of Land Reforms constituted by the Government of India. The learning from several common land development projects, such as the Tree Growers’ Cooperatives Project, could be utilized for this purpose.

4.2.2.5 Engagement with Panchayati Raj Institutions

There is a need to engage with and build capacity of PRIs, which are often custodians of such common lands, especially grazing lands, known by different names in different states. Again, existing experience in this regard needs to be collated, documented and utilized for context-specific interventions. There is also a need for engagement with Revenue Administration (which controls many de facto common lands) and State Land Use Boards.

4.2.2.6 Productivity Enhancement

Even in areas where common lands are physically available (i.e. free from encroachments), these are often in a degraded condition with low productivity. Appropriate silvi-pasture models need to be developed to restore the productivity of these lands. In this regard, technical expertise of ICAR\(^{39}\) and ICFRE\(^{40}\) institutions could be tapped through development of appropriate collaborative mechanisms.

4.2.2.7 Demand Management

Demand side interventions – such as introduction of improved cook-stoves and providing better livestock to encourage stall feeding – that are socially and culturally appropriate need to be simultaneously undertaken while trying to enhance supply of products from common lands. Alternative uses for invasive species such as baskets from lantana, charcoal from *Prosopis juliflora*, and mulch from water-hyacinth not only reduces greenhouse gas emissions and pressure on alternative sources of such products (often forest lands) but also contributes towards controlling invasive species.

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\(^{39}\) Indian Council of Agricultural Research.

\(^{40}\) Indian Council of Forestry Research and Education.
4.2.2.8 Recognition of Critical Role of Common Lands in Providing Ecosystem Services

It should be recognized that apart from providing subsistence products such as fuelwood and fodder, common lands often provide other important ecosystem services (e.g. biodiversity conservation). An attempt should be made to preserve or enhance these services while preparing plans for development of these lands.

4.2.2.9 Watershed Management Program

Various interventions undertaken on common lands should be integrated on watershed basis to increase the focus on water resources critical to the rural population as well as the ecosystems themselves. The watershed program has been a major government initiative since the 1990s. A revised Integrated Watershed Management Programme has been launched by the Ministry of Rural Development with a new set of guidelines issued in 2008 (MoRD 2008). This should be a key program for convergence with respect to activities undertaken on common lands.

4.2.2.10 Monitoring and Evaluation

Like in the case of forest lands, there should be regular monitoring of the status of common lands. The study conducted by the NSSO in 1999 should become a regular feature. This was also recommended by the Sub-group (VI) of the Committee on Agrarian Relations and Unfinished Task of Land Reforms constituted by the Government of India.

4.2.3 Private Lands

4.2.3.1 Resource

In the context of this strategy, private lands mainly refer to agriculture lands in rural India. These lands cover more than 42% of the country’s geographical area (DAC 2013). Thus, agro-ecosystems are the dominant land use in the country and are critical for sustainable forest ecosystem management at the landscape level. Trees – for fuelwood, fodder, timber or other ecosystem services – are already an integral part of agricultural landscapes in the different parts of the country. Trees on agriculture lands – such as mango, coconut, neem (Azadirachta indica) and khejri (Prosopis cineraria) – contribute significantly to growing stock under “Trees Outside Forests” (TOF). These trees are already meeting 89% of the country’s wood demand (FSI 2011), but have considerable untapped potential as well. A national committee constituted by MoEF noted:

There is an immense potential for agro-forestry and farm forestry considering the favourable climatic conditions, growing demand for forest produce and opportunities for creation of jobs in the rural/peri urban areas41.

4.2.3.2 Existing and New Agro-Forestry Models

There are several existing agro-forestry models in the country – both traditional and contemporary. These need to be documented and their potential for introduction into various agro-climatic zones should be explored. At the same time, new agro-forestry models should also

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be developed in collaboration with national\textsuperscript{42} and international\textsuperscript{43} research organizations. These models have an immense potential from both carbon and livelihood perspectives. For example, while \textit{Prosopis cineraria} models are suited to only the dry north-western region of the country, they have been so widely adopted by the farmers of the region that \textit{Prosopis cineraria}\textsuperscript{44} contributes seventh largest growing stock of TOF nationally (FSI 2011).

4.2.3.3 Identification of Potential Species

There is a need to identify suitable potential tree species for different agro-climatic zones in the country that fit with local agriculture practices. It was the fit of poplar with wheat/sugarcane cultivation in the terai plains (e.g. poplar sheds its leaves when wheat needs ample sunlight) that was the key reason for its success and widespread adoption by the local farmers. Similarly the nice fit of \textit{Ailanthus excelsa} with local agriculture/ livestock practices (e.g. goat rearing) has led to its widespread adoption in some villages of Ajmer and Jaipur districts of Rajasthan.

4.2.3.4 Research and Development

Identifying suitable species is not enough, these species need to be further improved through selection and Research and Development (R&D), especially biotechnology-based approaches. For example, development of more productive eucalyptus clones by companies such as ITC led to their widespread adoption by farmers. In fact, farmers were willing to pay a much higher price for improved seedlings even when normal seedlings were being distributed free or at a nominal price by government agencies (see Saigal et al. 2002). There is a need to incentivise R&D by private sector players through appropriate policy measures. This research on developing more productive, disease resistant and locally-suited varieties/clones can go a long way in popularising tree growing among farmers. Along with research, there is also a need to develop supply chains for certified quality planting material for major agro-forestry/farm forestry species. This is also one of the recommendations of a committee on agro-forestry/farm forestry constituted in 2011 by MoEF.

4.2.3.5 Cultivation of NTFPs

There is considerable scope of cultivation of several NTFPs (especially medicinal and aromatic plants) that are collected from the wild. Such cultivation can reduce pressure on forest lands. The National Medicinal Plants Board (NMPB) has undertaken several important steps to promote such cultivation. The Board supports cultivation of a large number of medicinal plants such as Ashwagandha (\textit{Withania somnifera}), Ghritkumari (\textit{Aloe vera}), Safed Musli (\textit{Chlorophytum borivilianum}), Kokum (\textit{Garcenia indica}) and Satavari (\textit{Asparagus racemosus})\textsuperscript{45}. An attempt should be made to utilize existing opportunities (such as NMPB schemes) to promote cultivation of selected NTFPs in different regions.

4.2.3.6 Market Linkages

Establishment of market linkages is one of the most critical aspects of promoting farm and agroforestry. In areas where good linkages were developed, farm/agro-forestry flourished,
for example in and around Prakasam district in Andhra Pradesh. Company-farmer partnership models (outgrower schemes), such as those developed by ITC Bhadrachalam Paper Boards, JK Paper and BILT in Andhra Pradesh and Odisha, need to be encouraged and existing policy bottlenecks in their way removed (see Saigal et al. 2002). Provision of credit on easy terms is also likely to facilitate adoption of farm and agro-forestry on a large scale.

4.2.3.7 Removal of Policy Bottlenecks

Another key element is easing of felling and transit restrictions. In spite of considerable policy reforms over the years there are still many restrictions on tree/NTFP cultivation, especially related to felling and transport. A comprehensive assessment of these bottlenecks and constraints needs to be undertaken so that these could be removed. A committee constituted by MoEF on this issue noted:

*The Committee observed that the States which have least restrictions on tree felling and transit specially of preferred agro-forestry spp. by farmers have succeeded in large scale agro-forestry and farm forestry.*

The Committee suggested removal of such policy bottlenecks and recommended adoption of a regional approach to facilitate easy movement of farm/agro-forestry produce. Apart from removal of the obvious policy bottlenecks, a detailed study of areas where farm/agro-forestry is being practiced on a large scale by local farmers should be undertaken to understand the reasons for the same, so that learning/best practices from these areas can be adopted elsewhere.

Photo 4: Agriculture is the dominant land use in India, covering as much as 42% of the country’s geographical area.

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4.2.3.8 Convergence

At the field level convergence should be attempted with the relevant flagship government schemes in the agriculture sector, notably the Rainfed Area Development Programme, the National Horticulture Mission and the National Mission for Sustainable Agriculture.

5 CONCLUSION

The aim of this strategy paper is to promote integrated and sustainable management of forest ecosystems of India. The key elements underpinning this strategy are:

• Adoption of a landscape approach for holistic land use planning, while focusing on forest ecosystem services including their sustainable use to support local livelihoods.

• Convergence with relevant ongoing initiatives and utilization of existing policy and legal spaces to the extent possible.

• Developing or adapting innovative forest management models to promote context-specific sustainable forest ecosystem management.

• Encouraging women and other marginalized groups to have more active roles in communal sustainability practices.

The strategy builds on existing inter-linkages and policy spaces, thereby enhancing its efficacy and practicality. For example, interventions such as fodder development on common lands and agro-forestry on private lands are likely to reduce...
pressure on forest lands within the landscape. The focus on involvement of local communities, with a particular attention to gender dimensions, is likely to have a positive impact on both forests and rural livelihoods. Therefore, the strategy is likely to lead to better environmental, economic and social outcomes.

The implementation of this strategy will need close collaboration between key stakeholder groups at different levels. As one focus of this strategy is preservation/enhancement of carbon stocks to address climate change concerns and to take REDD+ actions to scale, implementation of actions recommended under this strategy will need to be dovetailed to the National Action Plan on Climate Change, especially four of its eight missions – National Mission for a Green India, National Mission for Sustaining the Himalayan Ecosystem, National Mission for Sustainable Agriculture and National Mission on Strategic Knowledge for Climate Change.

Actions proposed under this strategy will contribute towards meeting the national voluntary target of reducing the emission intensity of India’s GDP by 20-25% over 2005 levels by 2020. Forestry is recognized as a key sector for reducing emission intensity as investment in forestry provides double benefit – first by acting as a carbon sink and second by enhancing the GDP (Planning Commission 2011).

Finally, it is important that, while we tackle unsustainable practices within the country, we do not simply shift them elsewhere. India imports about 6 million m³ of wood in different forms (round log, sawn timber, etc.), which is twice the production of wood from its forest lands (FSI 2011). Therefore, an analysis of sources of this imported wood and its sustainable production is also needed. Global climate change can only be addressed through concerted action at the global level. We need to act locally but think globally!

Photo 5: Adoption of a landscape approach covering forest lands, common lands and private lands in an integrated manner is a key element of the proposed strategy.
6 REFERENCES


USAID Forest-PLUS is a bilateral program between India and the U.S. to develop solutions for sustainable forest land use in India. The program, in partnership with the Ministry of Environment, Forest and Climate Change (MoEFCC), prepares India to implement successfully Reducing Emissions from Deforestation and Forest Degradation (REDD+), an international mechanism for climate change mitigation, livelihoods improvement, and biodiversity protection.

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