Sustainable forest management in India

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In India, the criteria and indicators approach for sustainable forest management is being implemented on a pilot basis since 2000. The initiative, known as the Bhopal-India process, has over the years endeavoured to formulate a working framework for the achievement of the goals of sustainability specific to the national forestry conditions. Forests provide a wide range of ecological, economic and socio-cultural benefits for the communities, enhancing their quality of life. However, the dynamics of forest management in a developing country is unique, as the multiple uses of forests are clearly felt in a multi-stakeholder environment. The application and monitoring of criteria and indicators by the communities together with effective institutionalization and capacity-building can provide us tools to review the progress towards our goals of sustainability. This article discusses the application of criteria and indicator approach for sustainable forest management, giving a picture of the present situation in the country towards achievement of sustainability of our forest resources.

Keywords: Criteria and indicators approach, forest management, sustainability.

THE intense global debate on sustainable development and sustainable management of natural resources can be traced back to the 1970s, when there was a growing concern regarding their depletion and degradation. Sustainable development is commonly defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs[1]. Sustainable forest management has been considered as an integral component of sustainable development since the UNCED Conference at Rio de Janeiro in 1992, also called the Earth Summit. After the summit[2], where international forest principles were formulated for the first time by world leaders and the first global policy on sustainable forest management was adopted, the notion of sustainable forest management rapidly gained interest. Accordingly, the forest resources and lands should be managed sustainably to meet the social, economic, ecological, cultural and spiritual functions, and for the maintenance and enhancement of biological diversity. The concept got support and recognition in various international fora for the management, conservation and sustainable development of all types of forests. There have been numerous initiatives and processes in the world to streamline the efforts towards sustainable forest management.

Over the years since then, the criteria and indicators approach developed as a potent tool for assessment, monitoring and reporting of sustainability of forest resources. Now, some indicators relating to forest area change have been included among 48 indicators of the Millennium Development Goals of the United Nations, particularly under Goal 7, to ensure environmental stability which contains Target 9 – integrate the principles of sustainable development into country policies and programmes, and reverse the loss of environmental resources. The indicators for it are indicators 25 (proportion of land area covered by forest) and 26 (ratio of area protected to maintain biological diversity to surface area) towards the fulfilment of the Millennium Development Goals.

Sustainable forest management encompasses all the three components of sustainability, viz. ecological, economic and socio-cultural well-being. It has been defined by the International Tropical Timber Organization (ITTO) as 'the process of managing permanent forest land to achieve one or more clearly specified objectives of forest management with regard to the production of a continuous flow of desirable forest products and services without undue reduction of its inherent values and future productivity and without undue undesirable effects on the physical and social environment'[3].

Sustainability is not an absolute, independent of human conceptual framework. Rather, it is always set in the context of decisions about what type of system is to be sustained and over what spatio-temporal scale[4]. Given the abstract nature of sustainability, the criteria and indicators approach provides a framework to define the parameters and goals of socio-cultural, economic and ecological aspects relating to sustainability and assess progress towards them.

Forest management in India

The forestry sector in India is among the first in the world to be managed on the lines of modern scientific manage-

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ment. Establishment of forest management from the middle of the eighteenth century incidentally coincided with the industrial revolution in the West[5]. The forests emerged as important resources during the pre-independence period, as the demand for raw materials increased, and a need was felt to expand the railway network[6]. Forestry was thus production-oriented at that time. However, the basic change in perception was brought by the National Forest Policy of 1952, from production forestry to focus on meeting objectives of maintaining ecological balance on the one hand and meeting the needs of stakeholders in the best possible way on the other[7].

The 1988 National Forest Policy[8] focused on the maintenance of environmental stability, conservation of natural heritage by preserving the natural forests and meeting the basic needs of people, and also maintaining the relationship between the tribals and other dependent people, thus encompassing ecological, economic and social aspects of forest management. There is however an urgent need to monitor and ensure proper implementation of these policy implications. The quantifiable approach like criteria and indicators to monitor and implement these objectives of sustainability is imperative.

Why sustainable forest management?

Increased pressure on forest resources of the country over the last few decades has threatened the livelihoods of millions of forest-dwellers and other poor people living in the vicinity of the forests. Forest resources have been important for the prosperity of any nation and its communities. They are an essential natural resource providing multiple benefits to people besides other important functions such as biodiversity conservation, global carbon storage and a storehouse for future option values. The rich and the poor alike are dependent on forest resources, directly or indirectly, and forestry in many developing countries, including India is also seen as a means for eradicating rural poverty and achieving sustainable development. The pressure on existing forest resources is immense in India. Having only 2.5% of the world's geographic area and 1.85% of the world's forest area, we have 17% of the world's population and 18% of livestock population[9]. In this context, it is imperative to preserve the forests and manage them sustainably, so as to ensure secure livelihood of the forest-dependent communities as well as conserving our biological diversity.

Recently, as a result of increasing public awareness and various treaties and conventions all over the world, there is a movement towards accepting only those forest products which have originated from sustainably managed forests[10]. It has emerged as a market-based mechanism in support of sustainable forest management. Certification and eco-labelling are such new mechanisms enhancing forest-product positioning for a premium price on the one hand, and ensuring better managing practices for forests on the other.

Criteria and indicators approach for sustainable forest management

In the forestry sector, there is a paradigm shift from a focus on sustained timber yield to sustainable forest management, encompassing in it environmental, economic and social dimensions. The principle of sustained yield is considered as the focus of forest management ever since the forests were managed on modern scientific basis. It is an accepted norm in forest management and forms the core of modern, organized forestry. Scientific knowledge is needed all over the world to effectively address these issues globally and regionally, and to provide the technical basis for policy decisions.

There have been many international initiatives with potential application to define and assess sustainable forest management, such as criteria and indicators, life cycle assessment, cost–benefit analysis, knowledge-based systems and environmental impact assessment[11]. The criteria and indicator method has been widely accepted and immense work has been done towards its refinement and practical application. Over the years, it has developed as a potent tool for assessment, monitoring and reporting of sustainability of forest resources. Currently, about 160 countries are participating in nine regional and international processes of sustainable forest management following the criteria and indicator approach, mostly within the framework of an international initiative, which are specific to various forestry conditions[12,13].

The criteria and indicators approach presents a tool for assessing the magnitude and direction of change in given forestry situations, and this provides critical information to the forest managers and other actors for forest-related decision-making. It is an important framework to assist countries collect, store and disseminate reliable science-based forest information needed to monitor and assess forest conditions[13]. Criteria define and characterize the essential elements, as well as a set of conditions or processes, by which sustainable forest management may be assessed. The criteria and indicators provide a robust framework not only to define sustainability in the context of individual countries, but also provide a mechanism for understanding, monitoring and analysing national and global trends[14]. These are instruments through which progress towards sustainable forest management may be evaluated and reported. Castenada[15] defines criteria as the range of forest values to be addressed and the essential elements or principles of forest management against which the sustainability of forests may be assessed. Each criterion relates to a key element of sustainability and may be described by one or more indicators. While indicators are parameters that measure specific quantitative and qualita-

Table 1. Brief description of major internationally recognized processes on criteria and indicators and the number of participating countries[17]

Process	No. of criteria	No. of indicators	Place of adoption	Date of adoption	No of countries	Reference
ITTO Initiative on criteria and indicators	7	66	Yokohama, Japan	March 1992	59	3, 24
Dry-zone Africa Process	7	47	Nairobi, Kenya	November 1995	30	25
Pan European Forest Process	6	27 quantitative, 101 descriptive	Helsinki, Finland; Lisbon, Portugal	June 1993 June 1998	37	26
Montreal Process	7 (non-legally binding)	67	Santiago, Chile	February 1995	12	27
Tarapoto Proposal	1 global, 7 national, 4 forest management unit (FMU)	7 global, 47 national, 22 FMU	Tarapoto, Peru	February 1995	8	28
Near East Process	7	65	Cairo, Egypt	October 1996	30	29
Lepaterique Process of Central America	4 regional, 8 national	40 regional 53 national, 50 FMU	Tegucigalpa, Honduras	January 1997	8	30
African Timber Organization	28	60	Libreville, Gabon	January 1993	13	31
Regional initiative for dry forests in Asia	8	49	Bhopal, India	December 1999	9	18

tive attributes and help monitor trends in the sustainability of forest management over time.

International initiatives

The criteria and indicators approach for sustainable forest management was initiated by the ITTO[16]. At present, there appears to be growing international consensus on the key elements of sustainable forest management. There are nine on-going international and/or regional criteria and indicators initiatives currently, involving approximately 160 countries with some member-countries participating in more than one process. Table 1 summarizes these nine processes[17].

Seven common thematic areas of sustainable forest management have emerged based on the criteria of the nine ongoing regional and international sustainable forest management initiatives. These were acknowledged by the international forest community at the fourth session of the United Nations Forum on Forests (2004) and the 16th session of the Committee on Forestry (2003). These seven thematic areas include: (i) Extent of forest resources; (ii) Biological diversity; (iii) Forest health and vitality; (iv) Productive functions of forest resources; (v) Protective functions of forest resources; (vi) Socio-economic functions, and (vii) Legal, policy and institutional framework.

The Indian initiative

The criteria and indicators approach developed with development of a specific set of criteria and indicators for specific forestry conditions through international processes among the participating countries. It was realized to develop sustainable forest management in India, to accomplish establishment of a benchmark for sustainability according to the prevailing policy framework. In 1999, a workshop on 'Development of National Level Criteria and Indicators for the Sustainable Management of Dry Forests in Asia' was held at the Indian Institute of Forest Management (IIFM), Bhopal, with support from the Food and Agriculture Organization of the United Nations and the United Nations Environment Programme in collaboration with the ITTO, the United States Department of Agriculture Forest Service, and the IIFM. Now referred to as the 'Dry Forest in Asia Process', ten Asian countries jointly developed a regionally applicable set of national-level criteria and indicators relevant for dry forests in the region[18].

The Asia regional initiative was endorsed by the 'National Task Force on Sustainable Forest Management', appointed by the Ministry of Environment and Forests, Government of India. Thus, the Indian initiative of criteria and indicators approach for sustainable forest management was spearheaded by the IIFM in collaboration with ITTO and the Ministry of Environment and Forests, Government of India[14,19]. A series of national technical workshops and consultation meetings were held to sensitize communities, forest managers, NGOs and researchers about the need for developing a national and state/forest management unit (FMU) level set of criteria and indicators. A total of 8 criteria and 51 indicators specific to Indian forestry conditions were evolved after a consultative process involving a gamut of stakeholders. The criteria and indicators of the

Bhopal-India process have evolved after a lot of deliberations and field-testing over the years.

Present operational framework

We see the applicability of a set of criteria and indicators at the national or FMU level. The set of indicators is unique for a particular management unit. The forest presents a dynamic situation in the field as the forest resources are under the interplay of many situations. In this context, development of a site-specific set of indicators and standardizing their threshold values according the site-specific requirements, are of critical importance. The indicators of the Bhopal-India process were revisited through a workshop in March 2005, when a refined set of 8 criteria and 43 indicators have been evolved[20]. The criteria and indicators approach has over the years endeavoured to provide a working framework for the achievement of a site-specific set of sustainability indicators of forests. The national set of criteria and indicators of the Bhopal-India process is given in Table 2.

The criteria of the Bhopal-India process encompass all aspects of sustainability, i.e. ecological, economical and socio-cultural. Hence the criteria will remain the same whether it is for the national or FMU level. Applicability of indicators of sustainable forest management within the broad framework of the criteria varies with the specific forestry conditions. A method for developing FMU-level indicators has been standardized involving stakeholders, viz. foresters, local communities, researchers and academicians, and tested for development of indicators applicable to FMU level. This process involves sensitization of stakeholders to help in building an understanding of sustainable forest management followed by participatory development of indicators, creating and strengthening institutional framework and identification of working groups from among themselves for its operationalization.

The way ahead

Over the years, there has been a paradigm shift towards community participation in forestry management. However, a system for continuous monitoring of trends and progress towards sustainability is not in place[21]. Some aspects of forest management are being monitored on a regular basis, but in the light of the management objectives, a robust, all-uncommon passing system needs to be developed[22]. Involving the communities in the application and monitoring of the management systems through criteria and indicators can enhance the sustainability of people-oriented management initiatives. The system of criteria and indicators can help monitor the direction of change, whether towards or away from sustainable forest management.

The forest policy lays emphasis on raising productivity of forests by research and technical inputs, and for management under prescriptions of the working plans. Although the present Indian Forest Policy addresses the ecological (environmental), economic, socio-cultural and legal policy and institutional issues, there appears to be no such inbuilt mechanism to monitor and provide feedback on its implementation. The criteria and indicators approach for sustainable forest management therefore becomes an essential tool to bride this gap[21].

There have also been many efforts for institutionalization of the criteria and indicators approach. The forests in India are managed according to a scientifically sound, written management plan known as the 'Working Plan', and every division has a working plan which is revised after every ten years. Incorporating the monitoring and evaluation frameworks for sustainable forest management in working plans itself is imperative for institutionalization. The National Working Plan Code 2004 mentions incorporation of criteria and indicators in working plans for monitoring and evaluation of sustainable forest management[23]. Some working plans have already incorporated the aspects of criteria and indicators of sustainable forest management, like the Working Plans of Haldwani and Tarai East Forest Divisions of Western Circle of Uttarakhand (2006–07 to 2016–17). Many other State Forest Departments are also working towards incorporation of criteria and indicators in their working plan.

The implementation of sustainable forest management in a diverse country like India is a challenging task. To be more effective, criteria and indicators should be incorporated into national forestry legislations and regulation; not only as voluntary application. Being analogous with sustainable development, sustainable forest management also has important implications in the global economic scenario. Besides contributing to environmental, social and economic well-being of the communities, it also facilitates market-oriented tools like certification and ecolabelling. This requires active participation and coordination among the stakeholders for proper implementation. A wider application of criteria and indicators shall require a long maturity process.

The Ministry of Environment and Forests, Government of India has already created a Sustainable Forest Management (SFM) Cell in the Ministry in 2006. It is expected to act as a national-level focal point towards SFM in the country. Discussions are also in an advanced stage to create SFM Cells in each state. These SFM Cells are expected to act as a nodal point for all matters related to sustainable forest management in the country and to encourage development of national programmes aimed at sustainable utilization and conservation of forests.

Conclusion

One of the biggest challenges towards the outlook of forests in the recent times has been concerns about 'sustainability'

Table 2. Criteria and indicators of the Bhopal-India process[20]

Criterion	Indicator
Increase in the extent of forest and tree cover	Area and type of forest cover under natural and man-made forests (tree plantations) Forest area officially diverted for non-forestry purposes Forest area under encroachment Area of dense, open and scrub forests Tree cover outside forest area
Maintenance, conservation and enhancement of biodiversity	Area of protected ecosystems (protected areas) Number of Animal and plant species Number and status of threatened species Animal Plant Status of locally significant species Animal Plant Status of species prone to over-exploitation Status of non-destructive harvest of wood and non-wood forest produce
Maintenance and enhancement of ecosystem function and vitality	Status of natural regeneration Incidence of forest fire Extent of livestock grazing Forest area open for grazing Number of livestock grazing in forest Occurrence of weeds in forest Area Weed type Incidence of pest and diseases
Conservation and maintenance of soil and water resources	Area under watershed treatment Area prone to soil erosion Area under ravine, saline, alkaline soils and deserts (hot and cold) Soil fertility/site quality Duration of water flow in the selected streams Groundwater in the vicinity of the forest areas
Maintenance and enhancement of forest resource productivity	Growing stock of wood Increment in volume of identified species of wood Efforts towards enhancement of forest productivity Technological inputs Area under hi-tech plantations Area under seed production, clonal seed orchards, etc.
Optimization of forest resources utilization	Recorded removal of wood Recorded collection of non-wood forest produce Efforts towards reduction of wastage Aggregate and per capita consumption of wood and non-wood forest produce Direct employment in forestry and forest-based industries Contribution of forests to the income of forest-dependent people Demand and supply of wood and non-wood forest produce Import and export of wood and non-wood forest produce
Maintenance and enhancement of social, cultural and spiritual benefits	Number of Joint Forest Management committees and area(s) protected by them. Degree of people's participation in management and benefit-sharing. Level of participation of women. Use of indigenous technical knowledge: Identification, documentation and application Quality and extent to which concessions and privileges are provided Extent of cultural/sacred protected landscapes: Forests, trees, ponds, streams, etc. Type and area of landscape Number of visitors
Adequacy of policy, legal and institutional framework	Existence of policy and legal framework Number of forest-related offences Level of investment in research and development Human resource capacity-building efforts Forest resource accounting Contribution of forestry sector to the Gross Domestic Product. Budgetary allocations to the forestry sector Monitoring and evaluation mechanisms Status of information dissemination and utilization

of our resources. It has emerged as one of the main concerns of recent policy advocacy. The National Forest Commission in its report released in 2006, has recommended creating an enabling environment to facilitate assessment, monitoring and reporting on national-level criteria and indicators for sustainable forest management. This phenomenon of comprehensive management of forests addressing its ecological, economic and socio-cultural functions developed throughout the world, resulting in improved understanding of the forest managers and awareness among the people.

The sustainability of people-oriented management initiatives like joint forest management can be enhanced by involving the communities in applying and monitoring the sustainability by criteria and indicators approach. For application and monitoring of criteria and indicators by the communities, it is imperative that we take care of the institutionalization and capacity-building needs of the communities.

The criteria and indicators give an opportunity to monitor and assess the state of sustainable forest management. The approach provides a powerful yet user-friendly tool to forest managers. However, as with other monitoring and assessment frameworks, it ultimately rests with the forest managers to implement and analyse the framework to make sustainable forestry decisions. The criteria and indicators approach besides measuring sustainability of forests at a national level, envisages to monitoring it effectively.

Close international cooperation in forest science and related disciplines is required to enable forests to satisfy the manifold human needs in a sustainable way. Though the evolution of regional initiatives for criteria and indicators has been possible because of such cooperation in the first place, we may need to strengthen them for ensuring our goals of sustainability.

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