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Conservation Across Landscapes

India's Approaches to Biodiversity Governance



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Acronyms and Abbreviations

ACE	Autonomous Community Efforts
ADC	Autonomous District Council
AICOPTAX	All India Coordinated Project on Capacity Building in Taxonomy
ABS	Access and Benefit Sharing
BCRLIP	Biodiversity Conservation and Rural Livelihoods Improvement Project
BMC	Biodiversity Management Committee
BSI	Botanical Survey of India
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CAMPFIRE	Communal Areas Management Programme for Indigenous Resources
CBD	Convention on Biological Diversity
CBO	Community-Based Organization
CCA	Community Conserved Area
CEC	Central Empowered Committee
CFR	Community Forest Rights
C&I	Criteria and Indicators
CMS	Convention on Migratory Species
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COC	Chain of Custody
CSO	Central Statistical Organization
DAHDF	Department of Animal Husbandry, Dairying and Fisheries
DAC	Department of Agriculture and Cooperation
DBT	Department of Bio-Technology
DfID	Department for International Development
DLC	District Level Committee
EBA	Ecosystem Based Adaptation/Approach
EEC	European Economic Community
EEZ	Exclusive Economic Zone
EDC	Ecodevelopment Committee
EIA	Environmental Impact Assessment
ESA	Ecologically Sensitive Area
ESZ	Eco-Sensitive Zone
ETF	Elephant Task Force
FAO	Food and Agriculture Organization
FDA	Forest Development Agency
FDC	Forest Development Corporation
FMU	Forest Management Unit
FPC	Forest Protection Committee
FRA	Forest Rights Act
FSC	Forest Stewardship Council
FSI	Forest Survey of India

GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Green House Gas
GoI	Government of India
IBA	Important Bird Area
ICDP	Integrated Conservation and Development Project
ICFRE	Indian Council of Forestry Research and Education
IFCC	Indian Forest Certification Council
IIFM	Indian Institute of Forest Management
IRF	International Rhino Foundation
IRV	India Rhino Vision
IUCN	International Union for Conservation of Nature
IWC	International Whaling Commission
JFM	Joint Forest Management
JFMC	Joint Forest Management Committee
JFMN	Joint Forest Management Network
JFPM	Joint Forest Planning and Management
FRLHT	Foundation for Revitalisation of Local Health Traditions
MAB	Man and Biosphere
MDG	Millennium Development Goal
MEA	Millennium Ecosystem Assessment
MEE	Management Effectiveness Evaluation
MoEF	Ministry of Environment and Forests
MoIB	Ministry of Information and Broadcasting
MoTA	Ministry of Tribal Affairs
MoSPI	Ministry of Statistics and Planning Implementation
MPCA	Medicinal Plant Conservation Area
MSSRF	M.S. Swaminathan Research Foundation
NAEB	National Afforestation and Eco-development Board
NAP	National Afforestation Programme
NAPCC	National Action Plan on Climate Change
NBA	National Biodiversity Authority
NEP	National Environment Policy
NFAP	National Forestry Action Plan
NFC	National Forest Commission
NGO	Non-Governmental Organization
NPV	Net Present Value
NRA	National Resource Accounting
NTCA	National Tiger Conservation Authority
NTFP	Non-Timber Forest Product
NTGCF	National Tree Growers' Cooperative Federation
NWAP	National Wildlife Action Plan
PCCF	Principal Chief Conservator of Forests
PESA	Panchayats (Extension to the Scheduled Areas) Act
PBR	People's Biodiversity Register
POWPA	Programme of Work on Protected Areas
PRA	Participatory Rural Appraisal
PRI	Panchayati Raj Institution

R&D	Research and Development
REDD	Reducing Emissions from Deforestation and Degradation
RWE	Round Wood Equivalent
SAPCC	State Action Plan on Climate Change
SBB	State Biodiversity Board
SDLC	Sub-Divisional Level Committee
SFM	Sustainable Forest Management
SG	Sacred Grove
SIDA	Swedish International Development Co-operation Agency
TBPA	Transboundary Protected Area
TCF	Tiger Conservation Foundation
TCP	Tiger Conservation Plan
TEEB	The Economics of Ecosystems and Biodiversity
TGCS	Tree Growers' Cooperative Society
TTF	Tiger Task Force
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank
WII	Wildlife Institute of India
WWF	World Wide Fund for Nature
WCPA	World Commission on Protected Areas
WDPA	World Database on Protected Areas
WCMC	World Conservation Monitoring Centre
ZSI	Zoological Survey of India

Currency equivalents

INR equivalent of 1 USD (annual average)

2001-02	47.7
2002-03	48.4
2003-04	46.0
2004-05	44.9
2005-06	44.3
2006-07	45.3
2007-08	40.2
2008-09	45.9
2009-10	47.4
2010-11	45.6

Foreword



Empowered lives.
Resilient nations.

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The way we govern biodiversity is central to sustaining life on Earth. Given the high dependence of the poor on biodiversity and ecosystem services, biodiversity governance is of importance in realizing development goals. Approaches to biodiversity conservation across the world have typically taken two forms. One is state-driven conservation in the form of protected areas, and the other is community-led conservation. Both these approaches have had their share of successes and failures, generating intense debates on their effectiveness. We need to move away from these binary debates towards a broader discourse covering a range of models on biodiversity governance.

India's extraordinary biological diversity and variety of resource-use patterns has given rise to a range of approaches to biodiversity governance. This publication examines five biodiversity governance models that have helped conserve India's natural landscape. The publication presents salient features of these models and explores their effectiveness in terms of biodiversity conservation, community access to resources and sharing of benefits, and institutional design. It notes that these models are constantly evolving in concert with the rapid transformations in the social and economic landscape within which biodiversity is located. Biodiversity governance is complex and needs approaches that build on the combined strengths of various models.

The Indian experience of employing a range of biodiversity governance models to balance conservation and development has immense relevance in countries throughout the world. As emphasized in the UNDP's new Biodiversity and Ecosystems Global Framework 2012-2020, *The Future We Want: Biodiversity and Ecosystems – Driving Sustainable Development*, we need to unlock the potential of protected areas, including community conserved areas, to protect biodiversity while contributing towards sustainable development.

This publication was funded by the Biodiversity Global Programme of UNDP and we thank the Government of Norway for their support.

We hope this publication will further strengthen the effectiveness of biodiversity governance worldwide, building upon the shared knowledge of people and institutions.

A handwritten signature in black ink, appearing to read 'Lise Grande'.

Lise Grande

A handwritten signature in black ink, appearing to read 'Vandeweerd'.

Veerle Vandeweerd

Background



Humanity has always had a complex and symbiotic relationship with nature. However, as the impact of human activity on nature has become more intense in recent decades, this relationship has come under close scrutiny. The way we govern biodiversity has a direct bearing on sustaining life on Earth. Protected areas and community-based conservation are the two major streams of governance models attempted globally for biodiversity conservation. Both these models have had their share of successes and failures. What is clear now, is the need to move away from the often polarized 'for or against' debates that have characterized the discourse on biodiversity governance, towards a repertoire of models that can be adapted and applied to different situations. The Indian experience with multiple, often integrated, approaches to conserving biodiversity that balance conservation and development is immensely relevant to these global debates.

Introduction

Human well-being depends on biological diversity and ecosystems, and the goods and services they provide. Unprecedented loss of biodiversity and degradation of ecosystems over the past few decades pose new and urgent challenges. Addressing these challenges necessitates the strengthening of existing models of biodiversity governance and formulating new ones. The future of biodiversity and the very foundations of life on Earth depend on this.

Life on Earth is believed to have originated around 3.5 billion years ago.¹ Over time, it evolved into myriad fascinating forms through the process of speciation. Some of these life forms were, however, lost along the way through extinction. The current stock of species is a product of these two processes occurring simultaneously over a long period of time. To date, approximately 1.75 million species have been formally identified. While estimates of the total numbers vary widely, some scientists believe that there may be as many as 13 million species living on Earth.



Photo: Foundation for Ecological Security

Biological diversity or biodiversity refers to the variability among living organisms and the ecological complexes of which they are part. It includes diversity within species, between species and of ecosystems. While often understood in terms of the number of species, the term biodiversity has a much wider scope and includes genetic variations within species and between populations of species as well as the variety of ecosystems – deserts, forests, wetlands, mountains, lakes, rivers, agricultural landscapes, and so on – formed through interaction between living and non-living components of Earth.

Governance refers to the process whereby elements in society wield power and authority, and influence and enact policies and decisions concerning public life, and economic and social development. Governance involves interaction between formal institutions of government and those of civil society (IIAS, 1996).

There is considerable interest worldwide in biodiversity governance that could help in achieving the three main objectives of the Convention on Biological Diversity (CBD, 1993).² These are: 1) Conservation of biological diversity; 2) Sustainable use of its components; and 3) Fair and equitable sharing of benefits arising out of the utilization of genetic resources.

Of particular importance is the governance of forest ecosystems, especially tropical forests, due to their indisputably critical ecological and biological value, high sequestration and storage of carbon, and dependence of people living in and around them for their livelihoods. It is estimated that as many as 1.3 billion people are dependent on forests for their livelihoods worldwide (Chao, 2002). According to Sayer and Maginnis (2005), '[T]hroughout the world there has been a re-examination of who makes decisions about forests and how these decisions are made.'

India, one of the 17 countries identified as mega-diverse,³ has considerable experience in implementing various biodiversity governance models. These models have attempted to translate the CBD's vision into reality. This publication outlines India's approaches to biodiversity governance across a range of landscapes. It provides insight into five major governance models that

have been adopted for conservation, sustainable use, and fair and equitable sharing of benefits arising out of utilization of biological resources.

Chapter 1 locates India's experience in biodiversity governance in the global context. It looks at the importance of biodiversity and international experience in conservation efforts through two major biodiversity governance models – protected areas and community-based conservation. Debates on the relative merits and demerits of these models are also briefly touched upon. The chapter concludes with a short introduction to the biodiversity governance models implemented in India. Subsequent chapters provide a detailed analysis of these models.

Biodiversity: a critical but threatened resource

There is a growing realization that maintenance of biodiversity is vital for the well-being of present and future generations. Biodiversity underpins the functioning of ecosystems on which humanity depends for a range of essential services – provisioning, regulating, cultural and supporting (see Box 1.1 and Figure 1.1). The demand for these services is likely to go up in the coming years as a result of the rapidly expanding global economy and increase in human population, which is expected to reach nine billion by 2050.

BOX 1.1: 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 fibre, fuel, genetic resources, bio-chemicals, 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.

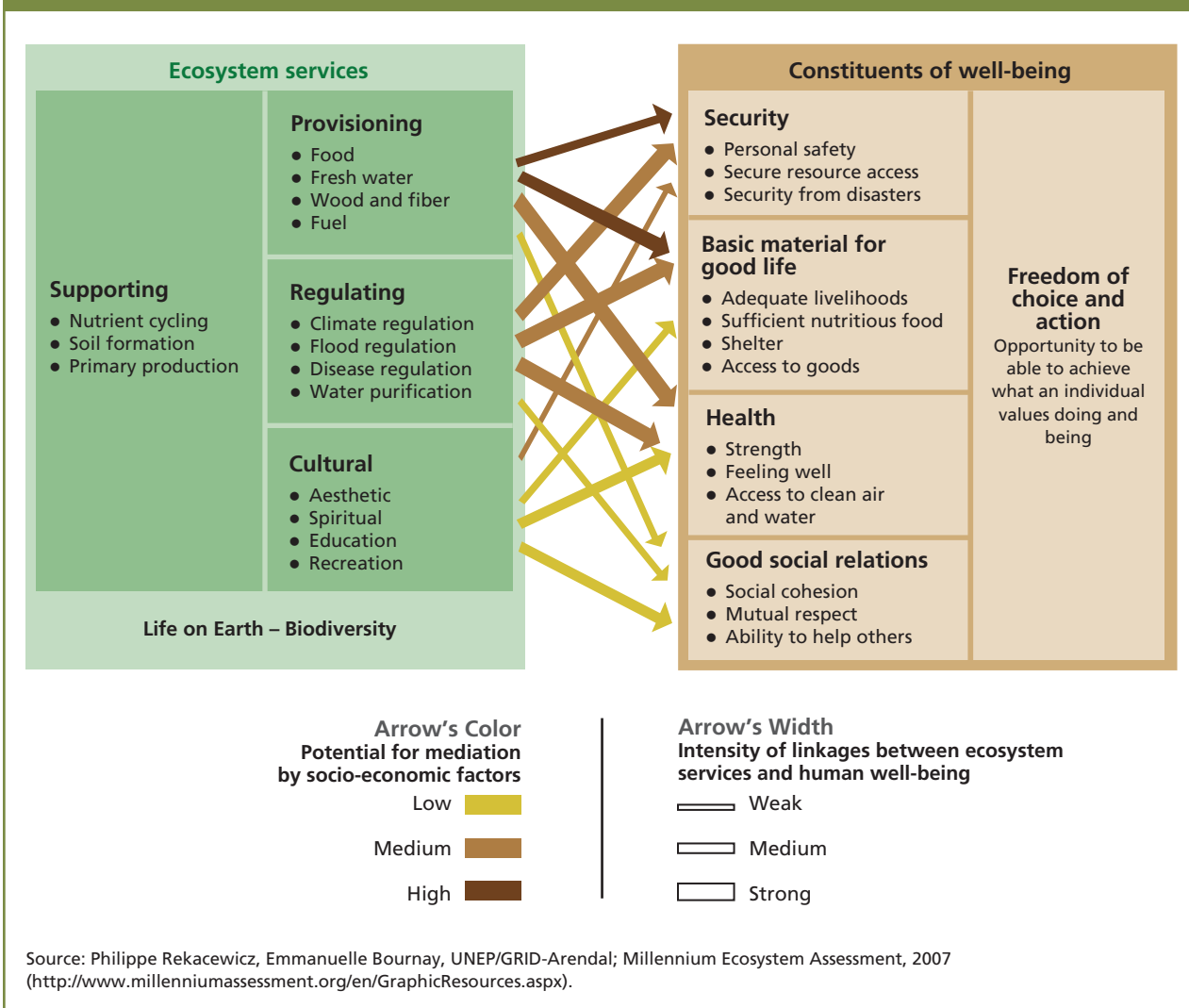
Source: MEA, 2005b.

Despite recognizing the fundamental importance biodiversity holds for human well-being, the world is currently witnessing an unprecedented and largely irreversible loss of biological diversity. This loss is driven by five key factors: 1) habitat loss; 2) unsustainable use and overexploitation; 3) pollution; 4) invasive alien species; and 5) climate change. The Millennium Ecosystem Assessment (MEA, 2005b) estimated that over the past few centuries, humans have increased extinction rates of species by as much as a thousand times as compared to extinction rates by natural processes. According to the Global Biodiversity Outlook 3 (2010), species in all taxonomic groups with known trends are, on average, being driven closer to extinction, with amphibians and warm water reef-building corals being particularly vulnerable. Nearly a quarter of all plant species is believed

to be threatened (CBD, 2010). Some authors have even compared the present scenario to mass extinction events that have occurred a few times during the history of life on Earth (see, for example, Leakey and Lewin, 1996).

Not only is the number of species on the decline, their populations and the ecosystems where they are nestled are also vanishing at a rapid pace. The population size or range (or both) of a majority of species is diminishing across a number of taxonomic groups (MEA, 2005a). The Global Living Planet Index (2010), which monitors populations of selected vertebrate species, has fallen by over 30 percent since 1970, suggesting that, on average, vertebrate populations have declined by nearly one-third during this period (WWF, 2010).

FIGURE 1.1: Linkages between ecosystem services and human well-being



Biodiversity governance models: two key streams

The battle against species extinction has been the main driving force for the emergence of the global conservation regime (Adams, 2004). One stream of governance models, that became the cornerstone of global biodiversity conservation since the beginning of the 20th century, has focused predominantly on protected areas (Adams and Hutton, 2007; see Box 1.2 for categories of protected areas). However, over the past few decades, another important stream of governance models has concentrated on community-based conservation. Although this stream has received worldwide attention and recognition in recent decades, it pre-dates the establishment of the formal protected area network. In parallel with the development of community-based conservation approaches, there has been a growing recognition of the need for protected areas to also involve and promote the livelihoods of communities living in or around them. These two

streams of biodiversity conservation and governance are discussed briefly in the two sub-sections below.

Protected areas

According to the CBD, a protected area is 'a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives.' The concept of protected areas has existed for at least a few thousand years in the form of private and communal game reserves and spiritual areas (Brockington *et al.*, 2008; Ervin *et al.*, 2010). The earliest record of a government-sponsored protected area in India dates from the reign of Emperor Ashoka, which pre-dates the Christian era (Chape *et al.*, 2008). Modern protected areas in the form of national parks, however, originated in the United States in the second half of the 19th century (Adams, 2004). A key idea that influenced the expansion of the protected area network was the notion of *wilderness* – an area 'untrammelled by man'⁴ – that was popularized through the work of John Muir (founder of Sierra Club) and others (Guha, 2000).

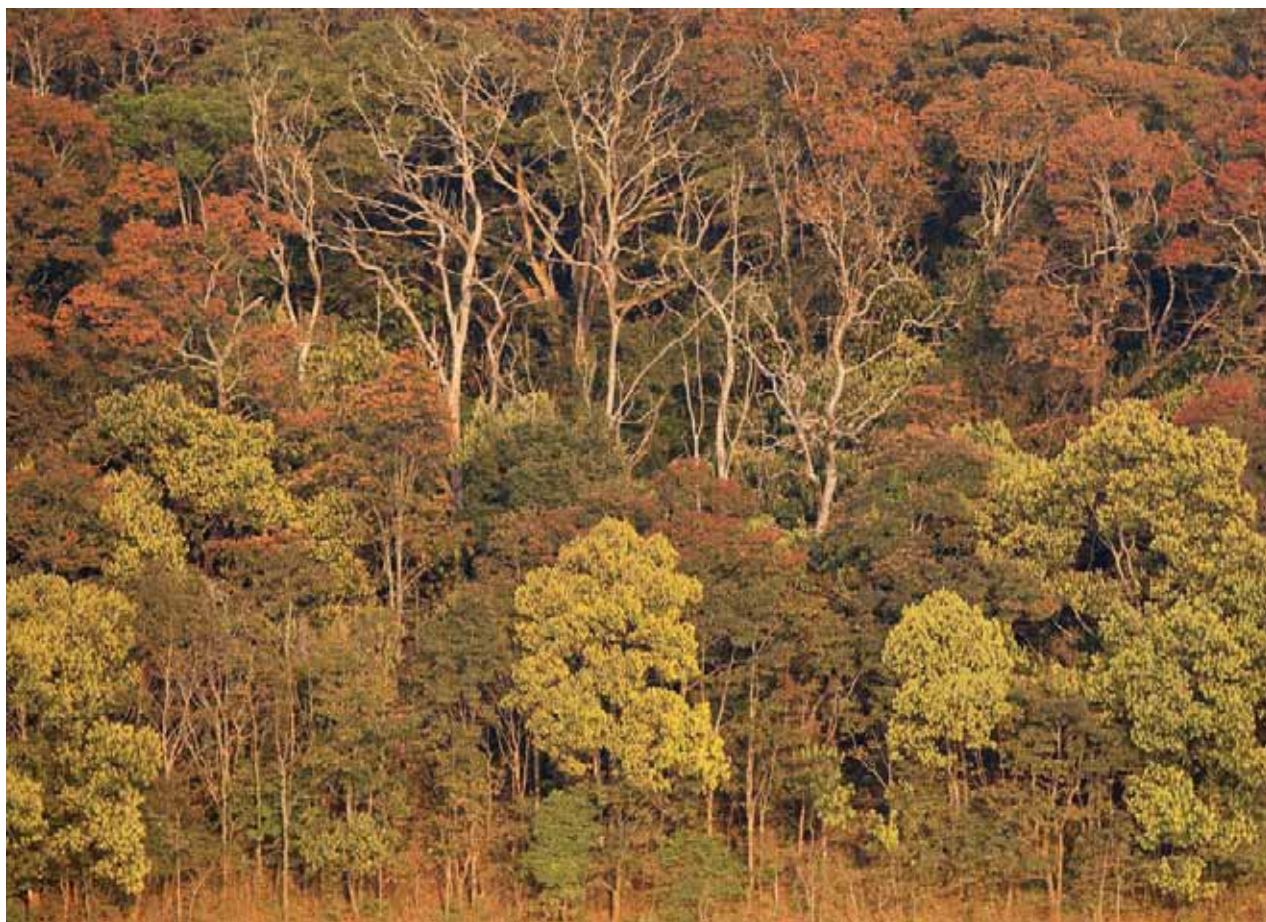


Photo: M. Balan

Another important factor that guided the establishment of protected areas was the need to gain control over biological resources, especially 'game' animals (Adams, 2004; Chape *et al.*, 2008). It has been argued that colonial hunters played an important role in the expansion of the protected area network in several countries (Adams, 2004). But, it is also true that many conservation ideas had their origin in traditional approaches to managing ecosystems in these countries (Grove, 1990, 1995).

Globally the protected area network has expanded significantly in the past few decades. At the time of the First World Conference on National Parks in 1962, there were 13,041 protected areas⁵ covering an area of around 1.6 million km². In 2004, the CBD adopted a Programme of Work on Protected Areas (POWPA), which provided further impetus to the creation and expansion of protected areas in many countries. By 2011, the total number of protected areas had reached 157,897⁶ and the

BOX 1.2: IUCN protected area categories

<p>Ia Strict Nature Reserve</p>	<p>Category Ia are strictly protected areas set aside to protect biodiversity and also possibly geological/ geomorphic features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for scientific research and monitoring.</p>
<p>Ib Wilderness Area</p>	<p>Category Ib protected areas are usually large unmodified or slightly modified areas, retaining their natural character and influence without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.</p>
<p>II National Park</p>	<p>Category II protected areas are large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible, spiritual, scientific, educational, recreational and visitor opportunities.</p>
<p>III Natural Monument or Feature</p>	<p>Category III protected areas are set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave or even a living feature such as an ancient grove. They are generally quite small protected areas and often have high visitor value.</p>
<p>IV Habitat/ Species Management Area</p>	<p>Category IV protected areas aim to protect particular species or habitats and their management reflects this priority. Many Category IV protected areas will need regular, active interventions to address the requirements of particular species or to maintain habitats, but this is not a requirement of the category.</p>
<p>V Protected Landscape/ Seascape</p>	<p>A protected area where the interaction of people and nature over time has produced an area of distinct character with significant, ecological, biological, cultural and scenic value; and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.</p>
<p>VI Protected Area with Sustainable Use of Natural Resources</p>	<p>Category VI protected areas conserve ecosystems and habitats together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area.</p>

Source: Dudley, 2008.

area covered over 24 million km² – a twelve-fold increase in the number and a fifteen-fold increase in the area. By the beginning of 2012, the total number of nationally and internationally designated protected areas in the World Database on Protected Areas was almost 200,000 – covering 12.7 percent of the global land area (excluding Antarctica), 1.6 percent of the ocean area, 4.0 percent of marine areas under national jurisdiction (0-200 nautical miles), 3.5 percent of Exclusive Economic Zones (12-200 nautical miles) and 7.2 percent of coastal waters (0-12 nautical miles).⁷

However, the global protected area network is not without its limitations. First, despite impressive area coverage, a representative sample of biodiversity of all eco-regions has not been achieved. Of the 825 terrestrial eco-regions, only 56 percent have 10 percent or more of their area protected (CBD, 2010). In other words, nearly half (44 percent) of the terrestrial eco-regions fall below the 10 percent level. The proportion of the world's oceans and seas that are protected is even smaller.⁸ Second, many large protected areas are in low-diversity landscapes such as ice-caps and sand deserts (Mulongoy and Chape, 2004). Third, the effectiveness of conservation management systems varies across different protected areas (CBD, 2010) and some are just 'paper parks'. Fourth, creation of protected areas often conflicts with resource access and livelihoods of local communities, and in the past it has even led to forced displacement (Agrawal and Redford, 2009) and created political upheaval and social tension. Apart from this, voluntary relocation from newly established protected areas requires huge financial resources and identification of suitable lands for people's rehabilitation.

In part due to realization of the above shortcomings, protected area governance models have evolved over

time. While the 'classic model' was primarily State-managed and exclusionary (Ervin *et al.*, 2010), a number of alternatives have emerged. The involvement of non-State actors has increased sharply throughout the world. While no comprehensive database exists, anecdotal evidence suggests that private protected areas (known by various names) number in the thousands and cover thousands of hectares (Langholz and Krug, 2004; Carter *et al.*, 2008). An increasingly important variant is the protected areas established by large and well-funded non-governmental organizations (NGOs). These focus on direct action in identified priority sites, use science-based management and often purchase or lease sites of high biodiversity value. In recent years, these organizations have emerged as important players in global biodiversity governance (Chapin, 2004).

Apart from conventional protected areas, several other categories of sites of biodiversity importance have also emerged in the past four decades due to a number of key international initiatives, such as UNESCO's Man and the Biosphere Programme (MAB), the Ramsar Convention on Wetlands (1971) and the World Heritage Convention (1972).⁹

The MAB programme (which 'seeks to reconcile conservation of biological and cultural diversity and economic and social development through partnerships between people and nature'¹⁰) for instance, has led to establishment of 580 Biosphere Reserves in 114 countries. The Ramsar Convention has designated 2,006 wetlands of international importance, covering nearly 193 million hectares.¹¹ The World Heritage List includes 936 properties forming part of the world's cultural and natural heritage, which are considered to have 'outstanding universal value'. Of these, 183 properties are part of natural heritage while 28 are considered 'mixed' as they have both natural and cultural heritage value.¹²

Even as all the initiatives outlined above are extremely important, the key development in the past few decades has been an increasing focus on community-based conservation. While many community conservation initiatives pre-date the formal protected area network,¹³ it was only during the Fifth World Parks Congress held in Durban (South Africa) in 2003 that concerted worldwide effort for their recognition was

Photo: Satish Pande



initiated. The Durban Accord and Action Plan agreed at the Congress called upon governments to recognize and support the diversity of protected area governance approaches, including community conserved areas and indigenous conservation areas.¹⁴ This decision arose from the growing realization that 'protected areas cannot exist in isolation from the surrounding land and sea. Nor can they be managed without regard to the communities and economic activities within and around them'.¹⁵ By mid-2011, the World Database on Protected Areas included 700 sites known to be governed by indigenous people and/or local communities, covering over 1.1 million km².¹⁶ The increasing emphasis on community-based conservation models is linked to an increasing awareness of the importance of community-based approaches for natural resource management. These models are discussed next.

Community-based conservation

Community-based conservation – known by various names¹⁷ – emphasizes greater involvement of local

people in the management of natural resources, and extends beyond the boundaries of formal protected areas into wider landscapes. Some consider these initiatives as community-based conservation that 'place some power in the hands of rural groups who live close to the resources in question' (Brockington *et al.*, 2008). The emergence and spread of community-based conservation in recent decades is part of a broader trend brought about by the concept of sustainable development.

Community-based conservation models are based on the premise that it is possible to pursue environment and development goals simultaneously. Another key thesis underpinning these models is that local communities have inherent resource management capabilities, and therefore, only the right incentive structure needs to be established. These models represent a significant shift from the State-driven, centralized, technocratic and blueprint approaches that were dominant previously. The catalysts for this change came 'from above' (e.g. international donors and the State) as well as 'from below' (e.g. communities and social movements)

Photo: Foundation for Ecological Security



(Larson *et al.*, 2010). Some believe that the growth of community-based models is 'one of the most dramatic transformations in natural resource management in modern history' (Edmunds *et al.*, 2003).

Since the 1980s, there has been increased advocacy for the adoption of community-based models¹⁸ (Agrawal and Redford, 2006). This advocacy was partly based on the realization that cooperation and support ('buy in') of local people – especially indigenous peoples – was critical for successful biodiversity conservation. It was also considered ethically unjust and politically unfeasible to exclude people from protected areas without providing them with alternative means of livelihood (Brandon and Wells, 1992; Wells *et al.*, 1992). Moreover, even if protected areas were effective, they would not be sufficient for protecting a representative sample of global biodiversity. Given widespread settlement patterns and prohibitive costs for governments to purchase and manage vast tracts of land, a large proportion of biodiversity was always likely to fall outside the formal protected area network. Further, there was a change in thinking within the discipline of ecology wherein humans were increasingly seen as part of ecosystems.

The adoption of community-based models was influenced significantly by the increasing emphasis on decentralization and devolution (Agrawal and Ribot, 1999; Ribot, 2004). The belief that this would improve resource outcomes, livelihoods and equity¹⁹ has also led to a greater focus on tenure reform and participation of local people.²⁰ The adoption of the Millennium Development Goals (MDGs) – that identified poverty eradication and environmental sustainability as global imperatives – gave further impetus to community-based models. It was felt that it would not be possible to achieve these goals without focusing on the link between environment and poverty and acknowledging the central role of local governance institutions.

Community-based models employ three main strategies. They are: 1) providing compensation (or substitution); 2) promoting alternative livelihood opportunities; and 3) creating a direct stake in conservation for local people. While the first two approaches support preservation, the third reflects a conceptual shift from preservation to sustainable use (see Western and Wright, 1994; Hulme and Murphree, 1999; Hutton and Leader-Williams, 2003).



Photo: Ajay Kumar Saxena

Compensation or substitution is a strategy followed to offset loss (or opportunity cost) incurred by local people when they are denied access to resources. This loss can form a substantial proportion of household income. While the strategy is straightforward at the conceptual level, the key challenge lies in addressing practical questions such as 'who should benefit, by how much, and for how long' (Wells *et al.*, 1992, emphasis in original).

The second strategy of promoting livelihood alternatives has been mainly implemented through Integrated Conservation and Development Projects (ICDPs), which attempt to reconcile conservation and development goals (Barrett and Arcese, 1995). The objective is to reduce local people's dependence on destructive practices in the conservation areas by promoting a range of ecosystem-based and alternative livelihoods (for e.g., GEF-World Bank supported India Eco-development Project, 1996-2004). The underlying assumption is that once alternative livelihood options are available, local people will voluntarily refrain from exploiting resources that are of conservation interest (Wells *et al.*, 1992). However, a fundamental issue with this strategy is that while its focus is local, major threats to biodiversity often arise elsewhere.²¹ ICDPs have also been criticized in many instances for failing to substitute adequately for lost livelihood opportunities, and for paying only lip service to community benefits.

The third strategy focuses on creating a direct stake for local people in the resource by promoting access and sustainable use, both extractive (e.g. sport hunting) and non-extractive (e.g. tourism). The role of the market is generally emphasized, and it is sometimes also referred to as 'enterprise-based conservation'. Zimbabwe's CAMPFIRE²² programme, which enables material gains for participating communities, is one of the most well-known sustainable use programmes in the world. Zimbabwe undertook major legal reforms in the 1980s to allow wildlife revenue to be shared with Rural District Councils (Frost and Bond, 2006).

The international experience with community-based models indicates that their impact has had mixed results, with some positive and some disappointing outcomes. While compensation or substitution limits local people's economic loss, it often does not cover their entire opportunity cost. In any case, many resource extraction practices have a strong cultural basis in addition to their economic value and thus cannot be easily compensated for or substituted. The field experience with ICDPs has shown that while most projects have a short time horizon, many livelihood enhancement strategies need a much longer duration to start making substantive impact. Even in cases where there is a positive impact on livelihoods, it does not automatically translate into improved conservation. While sustainable use projects such as CAMPFIRE have helped in extending conservation beyond the boundaries of formal protected areas, the field experience has indicated that not all biological resources and areas have an equally high potential for the implementation of this strategy. Apart from the strategy-specific issues, some fundamental issues such as the concept of 'community' and meaning of 'participation' have also been raised by some commentators.



Photo: Ajay Kumar Saxena

Ongoing debates and relevance of the Indian experience

The mixed experience with both protected areas and community-based conservation has led to vigorous debates on appropriate biodiversity governance models. While some commentators have called for more stringent management of protected areas and State control, others have resisted this resurgent 'protection paradigm' and 'back to the barriers' approach (see Wilshusen *et al.*, 2002; Hutton *et al.*, 2005) and have advocated for a network of community-managed areas, especially by indigenous peoples. This debate is often highly polarized – for some, it is dangerous to depend on 'relatively powerless forest dwellers' to counter powerful forces driving deforestation (Redford and Sanderson, 2000), while for others 'any possibility of an ecologically sustainable future will originate in small, community-based initiatives' (Chapela, 2000).²³

It is becoming increasingly clear that neither 'exclusive' protected areas nor community-based conservation is a panacea for all conservation problems (Berkes, 2007), and therefore, it is futile to engage in such narrowly polarized 'for or against' debates. Moreover, there is a long continuum in both streams of models, which even overlap. For example, community conserved areas could be considered under both protected areas and community-based conservation. The need of the hour is to develop a repertoire of innovative models that can be employed in different contexts. Although there is an increasing understanding of the links between biodiversity conservation and human well-being (see, for example, TEEB, 2010), in many areas, the key challenge remains to develop governance models that balance conservation and development.²⁴ There is also increasing interest in mainstreaming biodiversity into various economic sectors, and policies and programmes (Petersen and Huntley, 2005; UNEP, 2010).

In this context, the rich Indian experience of employing a range of biodiversity governance models to balance conservation and development at different scales has immense international relevance. This book discusses five such biodiversity governance models existing in

India. The objective is not to be judgmental with regard to any particular model but to provide a balanced picture of achievements as well as challenges faced and the lessons learnt. It is presumed that this will allow the reader to weigh the pros and cons of these models and perhaps subsequently to allow for their adoption in other contexts with appropriate modifications.

It is hoped that this book would trigger a debate for a directional shift in biodiversity governance in India towards a landscape²⁵ approach. Landscape approach focuses on large, connected geographic areas to allow for recognition of 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.²⁶

Photo: Sanjayan Kumar



Different biodiversity governance models could be employed in different areas (e.g. State forest lands and adjoining village common lands) while keeping the overall functional integrity and resilience²⁷ of the landscape in mind. This approach will be the key to biodiversity conservation in the future as it 'will allow broader ecosystems to persist, not just the smaller protected parts of it' (Brockington *et al.*, 2008).

UNDP's new Biodiversity and Ecosystems Global Framework 2012-2020 – *The Future We Want: Biodiversity and Ecosystems – Driving Sustainable Development* – calls for a shift in focus towards the positive opportunities provided by biodiversity and natural ecosystems, in terms of harnessing their potential for sustainable development (UNDP, 2012). As considerable momentum gathers for the implementation of the Strategic Plan for Biodiversity (2011-2020) including the Aichi Biodiversity Targets (see Annexure 1), the lessons from this book could be drawn upon while preparing national biodiversity strategies and action plans for translating the global vision into action on the ground.

The five Indian models: a continuum across landscapes

The five biodiversity governance models that are the focus of this book helped India in conservation, sustainable use and fair and equitable sharing of its biological resources across different landscapes. While operating under various policy, planning and institutional frameworks, a common thread runs through all these models – an increasing conservation awareness among the people and emphasis on the participatory approach.

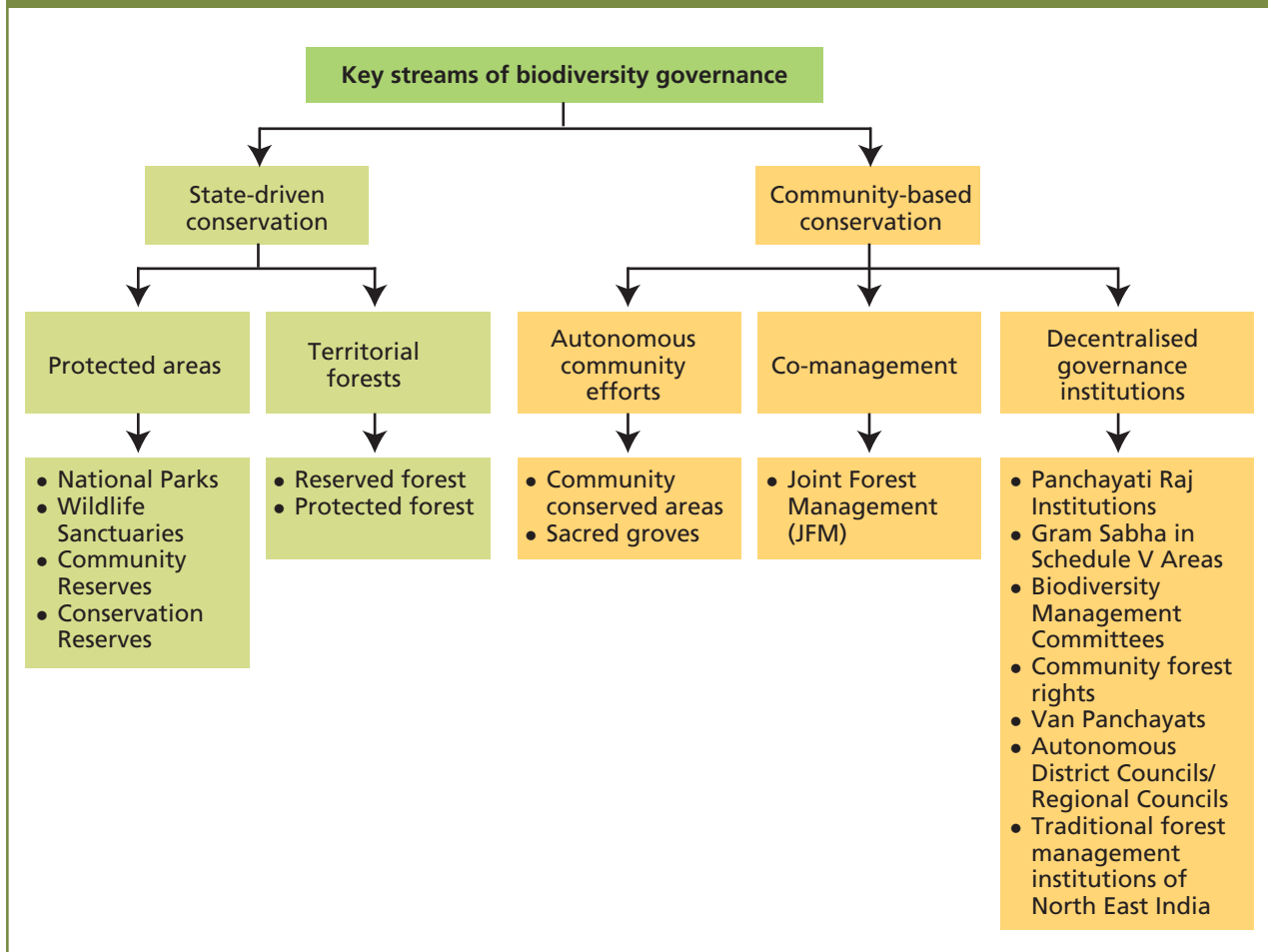
Participation as a concept has been debated vigorously in academic and policy circles (see, for example, Cooke and Kothari, 2001; Hickey and Mohan, 2004). Participation can take different forms, ranging from information sharing to empowerment (Vira and Jeffery, 2001). In order to understand the nature of participation, one needs to ask 'who participates, for what purposes and on what terms?' (Barrow and Murphree, 2001). Although the nature and extent of participation varies, an attempt has been made, in all the five models discussed in this book, to move beyond the superficial level closer towards its radical and transformative roots.



Photo: Anoop K.R.

The two models – territorial forests and protected areas – fall within the protected area stream of biodiversity governance models discussed above. The other three models – autonomous community efforts, co-management of forests and decentralized governance of biodiversity – are more closely aligned with community-based conservation. Each of these five models is briefly discussed below (see Figure 1.2).

FIGURE 1.2: Biodiversity governance models in India



1. Protected areas: Formal protected areas cover around 4.9 percent of the country's geographical area. They are an important component of India's biodiversity conservation strategy. Although many *maharajas* (kings) maintained *shikargahs* (hunting reserves) even earlier, establishment of formal protected areas started from the late 19th century. The first protected areas to be established were Vedanthangal in 1858 and Kaziranga in 1916, followed by Kanha in 1933 (Banjar Valley) and Corbett in 1936 (Hailey National Park). Although several more protected areas were gazetted in the ensuing decades, the real thrust came in the 1970s with the enactment of the Wildlife (Protection) Act, 1972 and the launch of Project Tiger in 1973. In the 1980s, a need was felt for a more planned network of protected areas to encompass the full diversity of the country's natural ecosystems. In response to this, the Wildlife Institute of India (WII) developed a biogeographic classification system. Subsequently, many more protected areas, including coastal and marine protected areas, were

established. Since the 1990s, there have been attempts to introduce a participatory approach in the management of protected areas, most notably through the concept of 'ecodevelopment'. New categories such as 'Community Reserves' and 'Conservation Reserves', which have been introduced recently, also attempt to broaden the concept of protected areas and encourage greater involvement of local people.

Chapter 3 of this book takes us through the journey of protected area management in India, highlighting its historical and cultural backdrop, legislative landmarks, achievements and challenges. The chapter is also embellished with interesting examples of protected area management and sites.

2. Autonomous community efforts: Autonomous community efforts (ACE) are initiated by communities for conservation and management of biological resources. ACEs in India are extremely diverse in terms of their

governance institutions, management objectives and ecological impact. Such efforts can be broadly classified into two categories – 1) community conserved areas (CCAs) and 2) sacred groves (SGs).²⁸ The main difference between the two lies in resource use. While resources in CCAs are generally appropriated for use, those in SGs are used only in exceptional circumstances, or for religious/spiritual reasons. While there is no comprehensive database, one estimate considers the total area under CCAs in India to be at least as great as the area under formal protected areas (Pathak, 2009). Similarly, while estimates vary widely, according to one (Malhotra, 1998), the number of SGs in the country could be between 100,000 and 150,000. While there is no specific policy or legal framework for autonomous community efforts, a number of different laws and policies have a bearing on these. So far, it is mainly civil society and community-based organizations (CBOs) that have played a key role in highlighting the importance of ACEs. As many ACEs are facing extreme challenges on account of rapidly changing socio-economic and political environments, a number of steps may be needed at different levels to ensure their long-term survival.

Chapter 4 of this book traces the contours of the autonomous initiatives by communities in India, detailing their diversity, management practices and institutional features. The chapter also discusses the effectiveness of these efforts, current challenges, and ways to strengthen them.

3. Territorial forests: Nearly a fifth of India's geographical area is classified as forest lands. There are two main categories – reserved and protected forests – that mainly differ in the extent of rights and privileges accorded to the local people.²⁹ The management of these lands has profound implications for biodiversity governance in the country. For example, as many as eight carnivore species have been recorded in Jeypore in the state of Assam, which is not a formal protected area, but a reserved forest.³⁰ Although outside the country's formal protected areas network, these forest lands nonetheless qualify as protected areas under IUCN categories (see Box 1.2). The State control of forests and their management through Forest Departments started in the colonial period. Although the initial focus was on extraction of timber and other commercially valuable forest products, the management of territorial forests has evolved over time. Territorial forests are now managed according to the principles of sustainable forest management (SFM) through working plans. There is increasing emphasis on conservation and meeting subsistence needs of local communities. Both these objectives are clearly enunciated in the National Forest Policy issued in 1988.

Chapter 5 of this book describes the history and evolution of modern forest management in India, and discusses the legal regimes and operative frameworks that guide the management of the territorial forests. The chapter also discusses the challenges that these forests face and offers a way forward.



Photo: Manoj Chandran



4. Co-management of forests: In recent decades, India has experimented with the concept of co-management of State-owned natural resources such as forests. Although community involvement in the management of State forests has a long history,³¹ it was a few successful experiments in community involvement on State forest lands in the 1980s³² that sowed the seeds of Joint Forest Management (JFM). Under JFM, the state Forest Department enters into an agreement with the local community, which is allowed greater access to the forest resources as well as a share in revenue, in return for protection of the forests against unauthorized extraction, encroachment and damage.

This idea received a major policy boost in 1988 when the National Forest Policy advocated the creation of a 'massive people's movement' to achieve national goals of afforestation/reforestation and meet the requirements of small timber, fuel wood, fodder and non-timber forest products (NTFPs) of the rural and tribal populations. The programme was formally launched in 1990 and has grown to become one of the largest community forestry programmes in the world. There are presently over 118,000 Joint Forest Management Committees (JFMCs) that protect/manage around 23 million hectares of forest lands.³³ Recently, attempts have been made to federate the JFMCs into

Forest Development Agencies, which are provided with financial support by the central government. The JFM programme is likely to play a significant role in Indian forestry in the coming decade as it has been identified as a major programme to tackle climate change under the 'Green India Mission'.³⁴

Chapter 6 describes the JFM approach, its spread, scale and scope and contains examples of community participation in forest governance. Further, the chapter discusses in some detail the challenges that JFM faces in India.

5. Decentralized governance of biodiversity:

India has devolved considerable powers to local self-government institutions in rural areas, which are known as Panchayati Raj Institutions (PRIs). These have a three-tier structure with Gram Sabha and Gram Panchayat as the basic unit, which are usually at the level of a village.³⁵ The Constitution (Seventy-third Amendment) Act, 1992 added a new Schedule to the Constitution of India (Eleventh Schedule) that lists 29 subjects devolved to PRIs. The list includes minor forest produce, social forestry, farm forestry and fisheries. The PRIs play an important role in the implementation of the Biological Diversity Act, 2002. Under the Act, every local body has to constitute a Biodiversity Management Committee (BMC) for the purpose of promoting conservation, sustainable use and documentation of biological diversity. An important function of the BMC is the preparation of a People's Biodiversity Register (PBR) that contains comprehensive information on availability and use of local biological resources, or any other traditional knowledge associated with them. Presently, 33,077 BMCs are functioning across 19 states.³⁶

Although local self-government institutions play an important role in biodiversity governance across the country, they have a particularly significant role in Schedule V and Schedule VI areas.³⁷ This relates to the implementation of several laws that are important from a biodiversity conservation perspective, most notably the Panchayats (Extension to the Scheduled Areas) Act, 1996 and the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006. In many areas of the North Eastern states, Autonomous District Councils (ADCs) play a central role in the management of natural resources.

Chapter 7 describes the increasing role played by local self-governments in biodiversity management. It also describes the challenges faced and possible ways to overcome them.

This book is divided into eight chapters. The second chapter presents an overview of India's biodiversity

heritage. It is followed by five chapters (3-7) that describe in detail each of the five biodiversity governance models mentioned above, the policy environment that has made them possible, the tools and mechanisms employed, and their strengths and weaknesses. The eighth and final chapter discusses the overall challenges in biodiversity governance and the way forward.

Endnotes

- ¹ The age of Earth is estimated to be around 4.5 billion years.
- ² This interest is evident from the fact that as many as 171 countries had adopted National Biodiversity Strategies and Action Plans (NBSAPs) by September 2010 (Prip *et al.*, 2010).
- ³ As defined by Conservation International in 1998.
- ⁴ From the definition provided in the Wilderness Act (1964) of the United States (Available from <http://www.wilderness.net/index.cfm?fuse=NWPS&sec=legisAct#2>. Accessed 9 May 2012).
- ⁵ 13,028 national and 13 international protected areas.
- ⁶ 130,709 national and 27,188 international protected areas.
- ⁷ World Database on Protected Areas (2012) (Available from <http://www.wdpa.org/Statistics.aspx>. Accessed 10 April 2012).
- ⁸ In 2011, the area of marine protected areas was just over 8 million km² as compared to over 16 million km² of terrestrial protected areas (Available from http://www.wdpa.org/resources/statistics/2012WDPA_Growth_Chart_Extent.xlsx. Accessed 10 April 2012).
- ⁹ Another important international initiative is the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 1973), which currently has 175 parties. While CITES does not have special sites, it has, nonetheless, made a significant contribution to biodiversity conservation by regulating international trade in specimens of selected species of wild animals and plants by subjecting it to certain controls (Available from <http://www.cites.org>. Accessed 2 May 2012).
- ¹⁰ United Nations Educational, Scientific and Cultural Organization. *Biosphere Reserves: Learning Sites for Sustainable Development* (Available from <http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/>. Accessed 1 May 2012).
- ¹¹ The Ramsar Convention on Wetlands, *The Convention Today* (Available from <http://www.ramsar.org>. Accessed 1 May 2012).
- ¹² United Nations Educational, Scientific and Cultural Organization and World Heritage Convention. 'World Heritage List' (Available from <http://whc.unesco.org>. Accessed 2 May 2012).
- ¹³ While comprehensive data is missing, it is estimated that there are a large number of community conserved areas (Brockington *et al.*, 2008).
- ¹⁴ International Institute for Sustainable Development. 'Summary Report of the Vth IUCN World Parks Congress: Benefits Beyond Boundaries, 8-17 September 2003' (Available from <http://www.iisd.ca/sd/worldparksV/sdvol89num9e.html>. Accessed 23 June 2012).
- ¹⁵ International Union for Conservation of Nature. 'The Durban Action Plan'. Revised Version, March 2004.
- ¹⁶ Available from <http://www.wdpa.org>. Accessed 15 March 2012.
- ¹⁷ This is often referred to as community-based natural resource management. Some other common terms include participatory management, joint management, decentralized management, indigenous management, and co-management (Pretty, 2002).
- ¹⁸ A major call was made at the 1982 World Congress on National Parks held at Bali (Wilkinson and Sandwith, 2011). These calls also drew upon concepts developed as part of the UNESCO's MAB programme (Adams and Hulme, 2001).
- ¹⁹ Such thinking stems from the principle of subsidiarity that 'decisions should be made at the lowest possible level where competencies exist' (Anderson, 2000).
- ²⁰ Participation has been promoted both as a means and an end in itself (Little, 1994).

- ²¹ For example, perverse subsidies are among major threats (Myers, 1998).
- ²² Communal Areas Management Programme for Indigenous Resources.
- ²³ This is beginning to change as some recent studies based on meta-analyses of published case studies have provided a more nuanced understanding of the impact of different models (see, for example, Shahabuddin and Rao, 2010; Porter-Bolland *et al.*, 2011).
- ²⁴ There is considerable policy and academic interest in this issue, especially in the context of forest ecosystems (see, for example, Wunder, 2001; Hulme and Murphree, 2001; Sunderlin, 2006; Gubbi and Macmillan, 2008; Redford *et al.*, 2008; Roe, 2008).
- ²⁵ According to WWF, a landscape is 'a contiguous area...with a specific set of ecological, cultural and socio-economic characteristics distinct from its neighbours'. 'The Landscape Approach' (Available from <http://assets.panda.org/downloads/po11landscapeapproach.pdf>. Accessed 27 July 2012).
- ²⁶ US Department of the Interior – Bureau of Land Management. 'Questions and Answers: The BLM's Proposed Landscape Approach' (Available from http://www.blm.gov/wo/st/en/prog/more/Landscape_Approach/landscapequestions.html#approach. Accessed 27 July 2012).
- ²⁷ Ecosystem resilience is a measure of how much disturbance an ecosystem can handle without shifting into a qualitatively different state. It is the capacity of a system to both withstand shocks and surprises and to rebuild itself if damaged (Stockholm Resilience Centre, 'Resilience Dictionary'. Available from <http://www.stockholmresilience.org/21/research/what-is-resilience/resilience-dictionary.html>. Accessed 27 July 2012).
- ²⁸ Although the term is a 'grove', it includes sacred ponds etc.
- ²⁹ A third category is village forests but the extent of area under village forests is relatively small.
- ³⁰ Tiger, leopard, Clouded leopard, Wild dog, Malayan sun bear, Golden cat, Marbled cat and Leopard cat.
- ³¹ For example, Van Panchayats (Forest Councils) in Uttarakhand, Gramya Jungles (Village Forests) in Odisha and Kangra Forest Cooperatives in Himachal Pradesh.
- ³² Most notably Arabari in West Bengal and Sukhomajri in Haryana.
- ³³ See Chapter 6 of this book.
- ³⁴ A part of the National Action Plan on Climate Change.
- ³⁵ According to the 73rd Amendment to the Constitution of India, Gram Sabha is a body consisting of all persons registered in the electoral rolls within the area of a Gram Panchayat. Gram Panchayat is a village self-government body consisting of representatives elected by members of the Gram Sabha.
- ³⁶ See Chapter 7 of this book.
- ³⁷ The Schedule VI areas are tribal areas in the North East states of Assam, Meghalaya, Tripura and Mizoram. The Schedule V areas are tribal areas in states other than those covered under Schedule VI.

Profile of India's Biodiversity

2

India's varied bio-physical environments, its unique position at the intersection of three biogeographic realms and unique cultural values have contributed to a rich biological heritage. The country's ten biogeographic zones cover a remarkable assortment of ecosystems and habitats – from the world's tallest peaks to the wettest places. Although India covers only 2.4 percent of the world's land area, it is one of the 17 'megadiverse' countries and accounts for around eight percent of the faunal and 11 percent of the world's floral species. India is also a major contributor to domesticated diversity – an estimated 6.7 percent of the global crop species are believed to be of Indian origin. Another key feature of the country's biodiversity is the high level of endemism, with nearly two-thirds of amphibians and over a third of angiosperms being endemic to India.

Introduction

The aim of this chapter is to provide an overview of India's biological diversity. It also sets the context for a deeper understanding of various governance models presented in subsequent chapters. Overall, the chapter is divided into three broad sections: biodiversity heritage is presented in the first, major threats and challenges in the second, and an overview of policy and legal framework for biodiversity governance in the third.

India is a unique blend of tradition and modernity. It is one of the oldest civilizations in the world and presently among the fastest growing economies. It has the second highest population (c. 1.2 billion),¹ the third largest economy² and the seventh largest area (c. 329 million hectares)³ in the world. Although well over half (58.2 percent) of the country's workforce is still employed in the agriculture sector (DAC, 2010), India is now the world's 10th most industrialized economy (MoI, 2008) and the sixth nation to have gone into outer

space. The country has made remarkable strides on the socio-economic front since its independence in 1947. Yet there are large sections of society still to receive the benefits of development in a significant way. The Planning Commission of India estimates that as much as 29.8 percent of the total population and 33.8 percent of the rural people were living in poverty in 2010 (Planning Commission, 2012). The country is currently passing through a critical phase in its developmental history with poverty alleviation, sustainable development and inclusive growth being major objectives of public policy. India's endeavour for sustainable management of natural resources is nested within this complex socio-economic and political context.

India's polity and governance framework is designed to accommodate these diversities and complexities. India is a federal country with 28 states and seven union territories (see Figure 2.1). The Constitution of India apportions responsibilities of governance between the centre and states. Matters such as forests, over which both the centre and states have the power to legislate, are termed

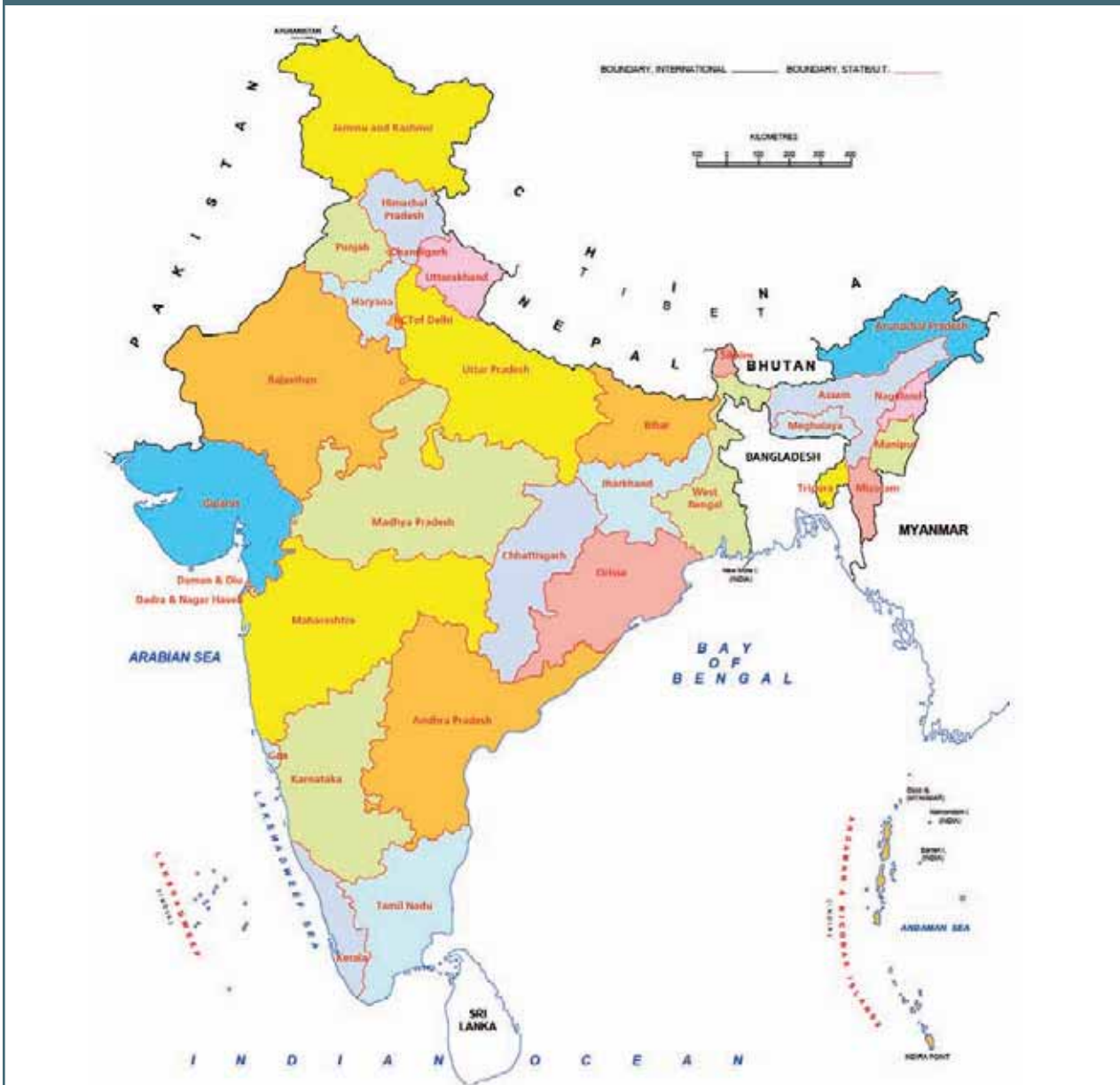


Photo: M. Balan

as 'concurrent' matters. Following the Constitution (73rd Amendment) Act, 1992, considerable powers have also been devolved to the democratically-elected Panchayati Raj Institutions (PRIs) at the village, intermediate and district

levels. There are special provisions for the administration of North Eastern states as well as areas having majority of Scheduled Tribes, which constitute around eight percent of the population.

FIGURE 2.1: Administrative map of India



The territorial water of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

The external boundaries and coastlines of India agree with the Record/Master Copy certified by Survey of India.

The state boundaries between Uttarakhand & Uttar Pradesh, Bihar & Jharkhand and Chhattisgarh & Madhya Pradesh have not been verified by the Governments concerned.

The administrative headquarters of Chandigarh, Haryana and Punjab are at Chandigarh.

The interstate boundaries amongst Arunachal Pradesh, Assam and Meghalaya shown on the map are as interpreted from the "North Eastern Areas (Reorganisation) Act, 1971," but have yet to be verified.

Source: Census of India, 2011.

India's biodiversity heritage

India has a unique geomorphological position. Its mainland is separated from the rest of Asia by the Himalayas. Flanked by the Arabian Sea and Bay of Bengal, it gradually tapers off into the Indian Ocean. The mainland could be divided into four main regions, viz., the Great Mountain Zone, the Indo-Gangetic Plains, the Desert Region and the southern Peninsula. The Indian mainland has some of the highest peaks in the world, one of the greatest stretches of flat alluvium, a major desert (the Thar) and a plateau (the Deccan). India also has two archipelagos – Lakshadweep Islands (coral) in the Arabian Sea and the Andaman and Nicobar Islands (volcanic) in the Andaman Sea.

Three unparalleled factors⁴ give India its biological opulence. First, there is an astounding spectrum of habitats and ecosystems existing over a wide range of latitudes and longitudes. These, together with varied climatic regimes, have resulted in an impressive range of bio-physical environments. Second, India lies at the confluence of three global centres of origin of life or 'Biogeographic Realms', viz., Indo-Malayan, Eurasian and Afro-tropical. India's flora and fauna have been enriched by elements from each of these realms. For example, *Shorea robusta* (a Dipterocarp) and Sambar deer (*Cervus unicolor*) are of Indo-Malayan origin, *Nageia wallichiana* (a Gymnosperm) and Nilgiri tahr (*Nilgiritragus hylocrius*)

of Eurasian origin and *Acacia chundra* (an Angiosperm) and Blackbuck (*Antilope cervicapra*) of Afro-tropical origin. Third, India has a legacy of coexistence of humans and nature and a longstanding tradition of conservation. These attributes are discussed in more detail in the following sections on ecosystem diversity and species diversity.

Ecosystem diversity: a rich tapestry

India offers a rich panorama of ecosystems across its mountains, coasts, wetlands and hinterlands. The Indian Himalayan region is spread over 53 million hectares and the total length of the coastline (including islands) is 7,517 km. It has both cold and hot deserts as well as the wettest place on Earth. It has some of the most prominent mountain chains in the world viz., the Himalayas in the north, Aravalis in the west-central region, Vindhyas and Satpuras in the central highlands and the Eastern Ghats and the Western Ghats in peninsular India. The Thar desert and the Rann of Kutch are unique in India's repertoire of ecosystems. Alpine pastures, high altitude conifer and broad-leaved forests, tropical rain forests, moist and dry deciduous forests, mangroves, scrub-savannah, grasslands and reed and cane breaks juxtapose in an amazing mosaic. It is this plurality of ecosystems and biomes that enriches and distinguishes India's biodiversity. To enable a deeper understanding, this section presents India's ecosystem diversity in relation to biogeographic zones and to specific ecosystems and habitats.

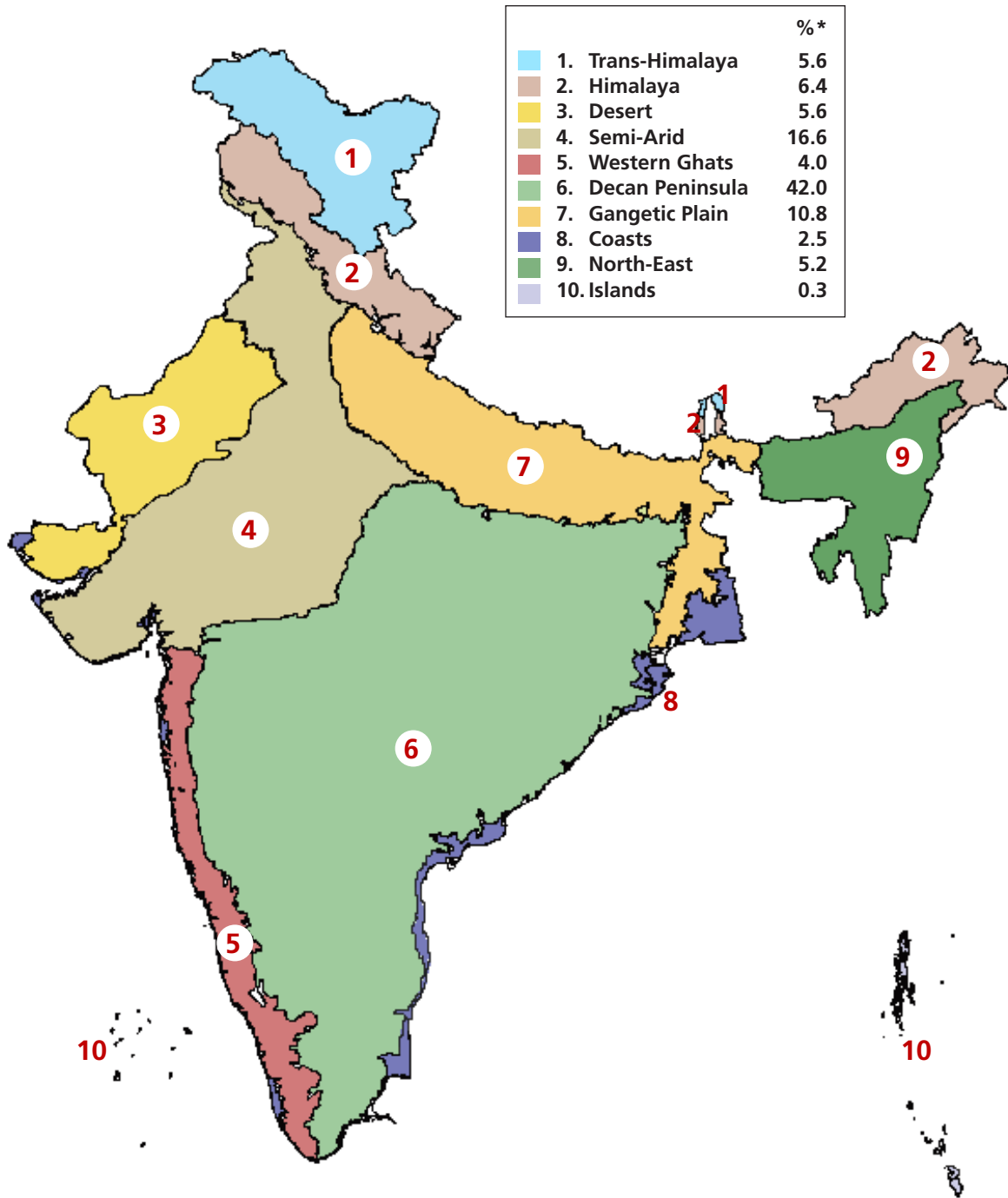
Biogeographic zones⁵

From the biodiversity perspective, the country has been divided into ten biogeographic zones (see Figure 2.2).⁶ The biogeographic zones cover a vast range: from the *Trans Himalaya* that is an extension of the Tibetan Plateau to the *Desert* zone in north-west India that houses the country's hot sand and salt deserts; from the *Western Ghats* and *North-East* zones that support evergreen forests to the *Semi-Arid* zone where grasslands and shrub lands dominate the landscape; from the *Himalaya* with its alpine forests and meadows to the *Deccan Peninsula* that covers as much as 42 percent of the country and contains a major plateau; from the *Gangetic Plain* with its mile upon mile of flat alluvium to the *Coasts* and *Islands* zones that are



Photo: Anoop K.R.

FIGURE 2.2: India's biogeographic zones



*Represents percentage of the total geographical area of India: 32,87,283 km²

© Wildlife Institute of India

Source: India State of Forest Report 2011, Forest Survey of India, Dehradun.

BOX 2.1: India's biogeographic zones

Trans-Himalaya	Constituting 5.6 percent of the country's geographical area, this zone includes high altitude cold and arid mountain areas, including cold deserts. An extension of the Tibetan Plateau, this zone has sparse alpine steppe vegetation with many endemic species. It supports some of the biggest populations of wild sheep and goats in the world as well as some rare species of fauna such as the Snow leopard (<i>Uncia uncia</i>). ⁷
Himalaya	Consisting of the entire Himalayan mountain range, this zone covers 6.4 percent of the total geographical area and has alpine and sub-alpine forests, grassy meadows and moist deciduous forests. It provides diverse habitats for a range of species including endangered ones such as the Hangul (<i>Cervus eldi eldi</i>) and Musk deer (<i>Moschus moschiferus</i>).
Desert	This arid zone falls west of the Aravalli hill range and comprises both the salt and sand deserts of north-western India. Constituting 6.6 percent of the country's geographical area, this zone also includes large expanses of grasslands that support several endangered species such as the Great Indian bustard (<i>Ardeotis nigriceps</i>).
Semi-Arid	This zone covers 16.6 percent of the country. Although semi-arid overall, this zone also has several lakes and marshlands. The grasses and palatable shrub layer of this zone support the highest wildlife biomass. The endangered Asiatic lion (<i>Panthera leo persica</i>) is also found in this zone (in the Gir forests of Gujarat).
Western Ghats	Western Ghats is a mountain range running along the western coast of peninsular India, from Tapti River in the north to Kanyakumari in the south. Constituting four percent of the country's geographical area, this zone supports tropical evergreen forests that are home to approximately 15,000 species of higher plants, of which around 4,000 (c. 27 percent) are endemic. There are several endemic faunal species as well, such as the Nilgiri langur (<i>Presbytis johnii</i>) and the Lion-tailed macaque (<i>Macaca silenus</i>).
Deccan Peninsula	This is the largest zone covering as much as 42 percent of the country. It supports some of the finest forests in India with abundant populations of deer and antelope species such as Chital (<i>Axis axis</i>), Sambar (<i>Cervus unicolor</i>) and Four-horned antelope (<i>Tetracerus quadricornis</i>). There are small populations of Asian elephants (<i>Elephas maximus</i>) and Wild water buffaloes (<i>Bubalus arnee</i>) as well.
Gangetic Plain	Flanking the river Ganga and its tributaries, the Gangetic Plain zone extends up to the Himalayan foothills in the north. This flat alluvial zone is topographically fairly homogenous and constitutes 10.8 percent of the country's geographical area. This zone supports many large mammals such as One-horned rhinoceros (<i>Rhinoceros unicornis</i>), Asian elephant and Wild water buffalo. Other characteristic fauna include Swamp deer (<i>Cervus duvauceli</i>), Hog deer (<i>Axis porcinus</i>) and Hispid hare (<i>Caprolagus hispidus</i>).
Coasts	The coastal zone constitutes 2.5 percent of the geographical area and covers beaches, mangroves, mud flats, coral reefs and marine angiosperm pastures. Sundarbans – shared with Bangladesh – is the largest contiguous mangrove area in the world.
North-East	Characterised by diverse habitats and long-term geological stability, the North-East zone covers 5.2 percent of India's geographical area. Due to its location at the junction of the Indian, Indo-Malayan and Indo-Chinese biogeographical regions, it is considered a 'gateway' for much of India's flora and fauna. There are significant levels of endemism in all floral and faunal groups found here.
Islands	Although this zone covers only 0.3 percent of the country's geographical area, it is nonetheless important from the biodiversity perspective. The Andaman and Nicobar Islands have some of India's finest tropical evergreen moist forests and show high degree of endemism in flora and fauna. The Lakshadweep Islands – having a biodiversity-rich reef lagoon system – are also included in this zone.

known for their mangroves, coral reefs and lagoons (see Box 2.1).

Ecosystems and habitats

India has a wide range of ecosystems and habitats, including forests, wetlands, grasslands, coasts, marshes and deserts. Almost all the major ecosystem types in the world can be found in India. The most important among these are discussed below.

a) Forests

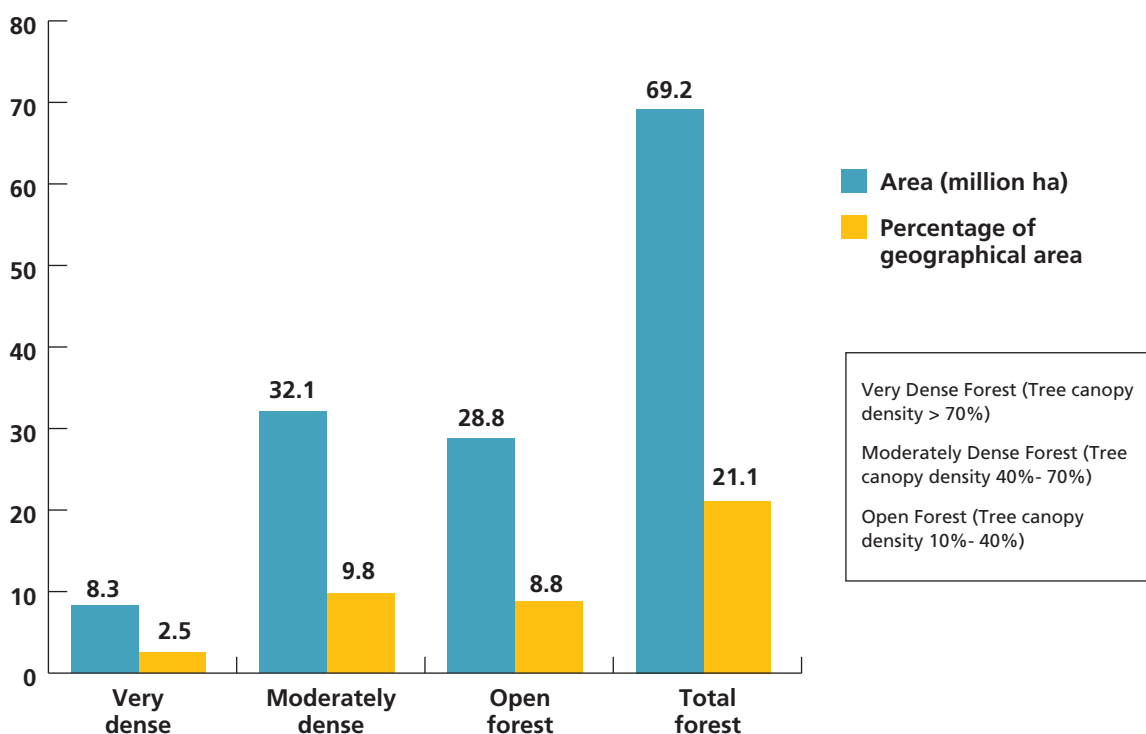
India is among the top 10 forested countries in the world. The actual forest cover (as determined through remote sensing in 2008) is about 69.2 million hectares or 21.1 percent of the geographical area (see Figure 2.3). In addition, estimates suggest the tree cover outside forests (patches of trees that are less than one hectare in area) to be a little over 9 million hectares. Thus, total forest and tree cover in the country is over 78 million hectares, or 23.8 percent of the country's geographical area (see Figure 2.4) (FSI, 2011).

India's forests are home to a number of mammals such as the Royal Bengal tiger (*Panthera tigris tigris*), the Asiatic lion (*Panthera leo persica*), the Asian elephant (*Elephas maximus*), Leopard (*Panthera pardus*), Wild water buffalo (*Bubalus arnee*), Indian bison (*Bos gaurus*) and the Sloth bear (*Melursus ursinus*). In addition, a number of deer and antelope species are found in different forest types, including the Indian gazelle (*Gazella bennettii*) and Four-horned antelope (*Tetracerus quadricornis*). The avifauna of Indian forests is also remarkably rich, including both resident and migratory birds (IC Net, 2011).

b) Grasslands

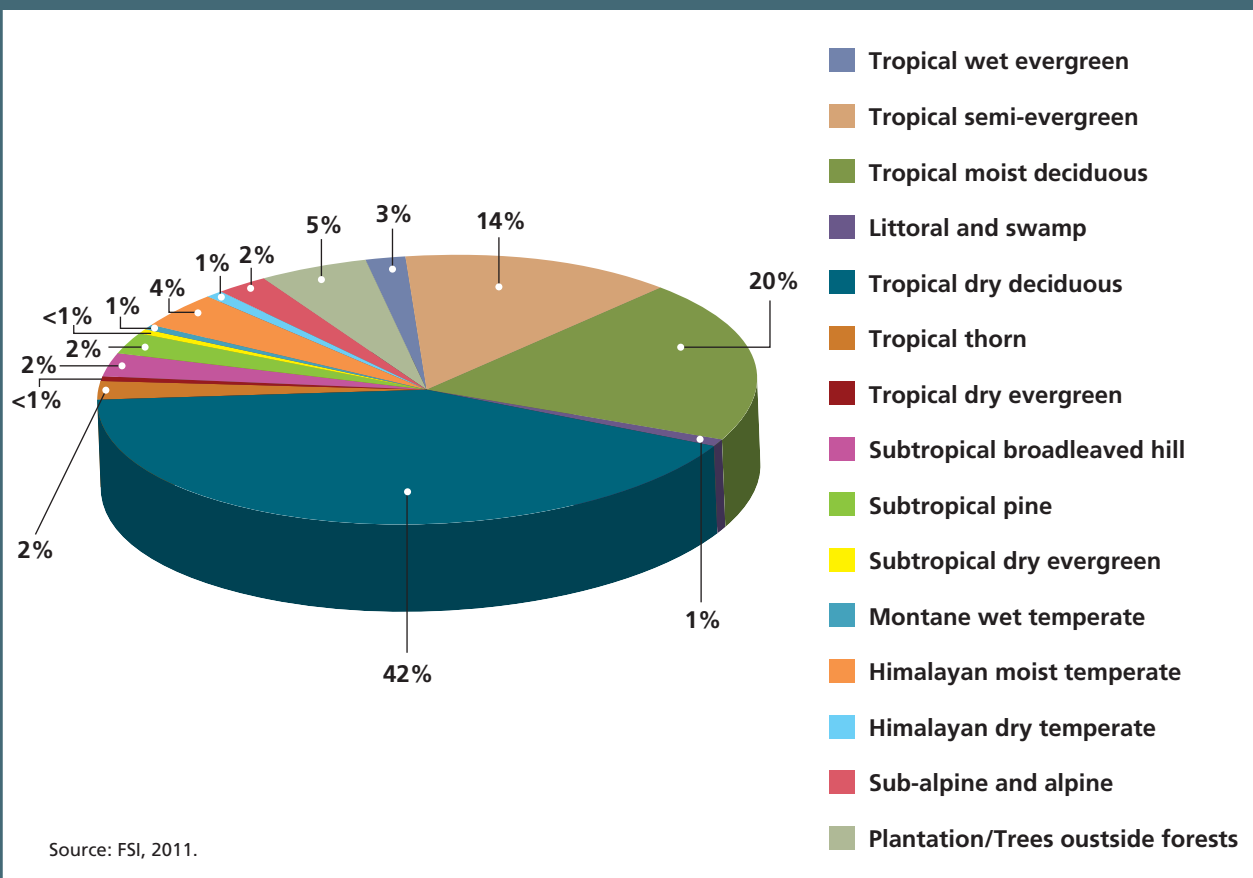
India has a rich array of grasslands – semi-arid pastures in the western part; *Banni* grasslands in the Kutch salt desert; humid, semi-waterlogged tall grasslands in the *Terai* (plains just south of the Himalayas); rolling *Shola*-grasslands on the Western Ghats hilltops; and high-altitude alpine pastures in the Himalayas (*Bugiyals*). A number of rare faunal species are found in grasslands, such as the Bengal florican (*Houbaropsis bengalensis*), One-horned rhinoceros (*Rhinoceros unicornis*), Pygmy

FIGURE 2.3: Extent of forest coverage by class



Source: FSI, 2011.

FIGURE 2.4: Distribution of forest cover across different forest types



hog (*Porcula salvania*), Hispid hare (*Caprolagus hispidus*), Wild water buffalo, Hog deer (*Axis porcinus*) and the Swamp deer (*Cervus duvauceli*) in the Terai grasslands; the Great Indian bustard (*Ardeotis nigriceps*) in dry, short grasslands; the Lesser florican (*Sypheotides indicus*) in monsoonal grasslands of western India; and the Nilgiri tahr (*Nilgiritragus hylocrius*) in the *Shola*-grasslands of the Western Ghats. The grass flora is also quite diverse, composed of about 1,256 species in 245 genera. The grasslands of India are not as well studied as its forests. The estimates of grasslands and shrub lands in India vary from 3.7 percent to as much as 12 percent of the area (UNEP, 2001; IC Net, 2011).

c) Wetlands

Wetlands in India exist across different geographical regions and have varied origins. They cover about 10 million hectares or three percent of the country's geographical area and support a variety of life-forms including around 150 amphibian and 320 bird species (UNEP, 2001). Many wetlands serve as important wintering sites for migratory birds. Around 25 of the

country's wetlands have gained international importance as Ramsar sites and six more are to be added to this list (see Annexure 2).

d) Coral reefs

The Indian reef area is estimated to contain about 200 coral species belonging to 71 genera spread around 0.24 million hectares. Coral reefs primarily occur in the Andaman and Nicobar Islands, the Gulf of Kutch, Gulf of Mannar and Lakshadweep Islands. The Andaman and Nicobar Islands alone have 179 coral species (UNEP, 2001).

e) Mangroves

India has some of the finest mangroves in the world, nestled in the alluvial deltas of the Ganga, Mahanadi, Godavari, Krishna, and Kaveri rivers and on the Andaman and Nicobar Islands. Mangrove vegetation is spread over 0.47 million hectares or 0.14 percent of the geographical area. India accounts for around three percent of the world's mangrove vegetation and almost half of it is located in Sundarbans in West Bengal (FSI, 2011).

The major mangrove species are *Avicennia officinalis*, *Excoecaria agallocha*, *Heritiera fomes*, *Bruguiera parviflora*, *Ceriops decandra*, *Rhizophora mucronata* and *Xylocarpus granatum*. The mangroves support 105 fish, 20 shellfish and 229 crustacean species. Among a range of avian and mammalian species, a notable inhabitant of mangroves is the Royal Bengal tiger, which roams the swamps of Sundarbans (UNEP, 2001).

f) Deserts

India has both hot (sand and salt) and cold deserts. The Thar desert – seventh largest in the world – is the main hot sand desert. Several species have adapted themselves to survive in the harsh desert conditions. The flora comprises 682 species (including 63 introduced species) belonging to 352 genera and 87 families. The degree of endemism of plant species in the Thar desert is 6.4 percent, which is relatively higher than the degree of endemism in the Sahara desert. Some of the endemic plant species are *Calligonum polygonoides*, *Prosopis cineraria*, *Tecomella undulata*, *Cenchrus biflorus* and *Sueda fruticosa*. The faunal diversity is also rich, with 755 invertebrate and 440 vertebrate species, including 140 bird and 41 mammalian species and the only known population of the Asiatic wild ass (*Equus hemionus khur*). The cold deserts cover 5.62 percent of the country's

geographical area where the temperature plummets to as low as -50°C during the winter. The flora has high level of endemism and these cold deserts are also home to many endangered animal species such as Asiatic ibex (*Capra sibirica*), Tibetan argali (*Ovis ammon hodgsoni*), Wild yak (*Bos mutus*) and Snow leopard (*Uncia uncia*) (NFC, 2006, MoEF, 2009b).

As is evident from the above, the unique mosaic of ecosystems and habitats in different biogeographic zones has created a number of biodiversity-rich landscapes. Although India has a number of such landscapes, two are of particular importance, the Eastern Himalayas and the Western Ghats, which are also included in the list of 34 global biodiversity 'hotspots' (see Box 2.2).

Species diversity: a mega-diverse country

India is one of the world's 17 'megadiverse' countries. It is home to many iconic species such as the Tiger, Asiatic lion, One-horned rhinoceros, Snow leopard, Gharial (*Gavialis gangeticus*) and Gangetic river dolphin (*Platanista gangetica*). Although India has only 2.4 percent of the world's land area, it accounts for seven to eight percent of the recorded species and is considered to



Photo: Manoj Nair

BOX 2.2: Two key landscapes - biodiversity hotspots

Eastern Himalayas

The Eastern Himalayas landscape is spread over India, Nepal, Bhutan and China. The Indian part has around 5,800 plant species, of which over a third are endemic. There is high level of endemism among certain families.⁸ Of the endemic flowering plants, 55 are considered to be rare. The landscape is considered an important centre of speciation of several plant families. It has wild relatives of many plants of economic importance, viz., rice, banana, tea, citrus plants, chilli, jute and sugarcane. Around 63 percent of genera of terrestrial mammals and over 60 percent of the bird species found in India have been reported from this landscape. At least 68 out of 240 amphibian species in India occur here. Four Endemic Bird Areas (EBAs) overlap entirely or partly with this 'hotspot'. The biodiversity of this landscape is still being explored. Even for a relatively well-studied class such as mammalia, two important new species – Golden langur (*Trachypithecus geei*) and Namdapha flying squirrel (*Biswamoyopterus biswasi*) – have been reported from this landscape in the past few decades (MoEF 2009a, 2009b).

Western Ghats

The Western Ghats is a mountain range that runs along the west coast of India. It has a number of forest ecosystems including the tropical wet evergreen, montane evergreen and moist deciduous forests. The *Shola* grasslands found in the higher reaches are unique to this landscape. The Western Ghats landscape is an important centre of speciation and endemism. Nearly a third of all flowering plant species of India are found here. Around 1,500 endemic species of dicotyledons have been reported from the area. Of the 490 arborescent taxa reported from the landscape, as many as 308 are endemic. Around 245 orchid species are found here, of which 112 are endemic. Overall, it is estimated that 38 percent of India's flowering plants and 63 percent of evergreen woody plants are endemic to this region. Many species are considered threatened, including 235 species of endemic flowering plants. The landscape is rich in faunal species as well. As many as 116 species of fish, 97 reptiles, 94 amphibians, 37 butterflies, 19 birds and 14 mammals are considered endemic to this landscape. The level of endemism is particularly high among amphibians, reptiles and fish. The mammalian fauna is dominated by bats, insectivores and rodents. Rare fauna of this landscape include the Lion-tailed macaque (*Macaca silenus*), Nilgiri langur (*Presbytis johnii*), Nilgiri tahr (*Nilgiritragus hylocrius*) and Malabar grey hornbill (*Ocyrceros griseus*) (MoEF 2009a, 2009b).

be among the top 10 species-rich countries in the world. New species are also being continuously discovered. During 2010-2012 alone, as many as 132 floral and 108 faunal species new to science and 161 floral and 296 faunal species new to India have been recorded (MoEF, 2011a, 2012). India is rich in both wild (floral as well as faunal) and domesticated (crop as well as livestock) biodiversity. This sub-section presents a snapshot of India's species diversity.

Wild biodiversity

a) Faunal diversity

With 91,797 recorded species, India accounts for 7.4 percent of the world's faunal species (ZSI, 2011). A significant proportion of species under many taxa is found in India. This includes as many as half of Merostomata,

a third of Echiura and over a quarter of Phoronida and Chaetognatha species. Among vertebrates, India accounts for 13.66 percent of bird, 12.12 percent fish, 8.58 percent mammal, 7.91 percent reptile and 5.60 percent amphibian species in the world (ZSI, 2011; see Annexure 3). In terms of the world's species-richness, India is fifth in reptiles, seventh in mammals and ninth in birds (MoEF, 2009b).

b) Floral diversity

India's contribution to global floral diversity is even higher than its contribution to faunal diversity. With over 45,500 recorded species, it accounts for nearly 11 percent of the world's floral species and ranks 10th in the world. The largest taxonomic group is Angiosperms with 17,527 species, followed by Fungi and Algae that have 14,500 species and 7,175 species respectively. In

percentage terms, it accounts for over a fifth of the world's Fungi and around a sixth of the world's Algae, Bryophyte and Lichen species (see Annexure 4).

Domesticated biodiversity

a) Crop diversity

Agriculture is the dominant land use in the country with a net sown area of 140 million hectares i.e. over 42 percent of the country's geographical area (Planning Commission, 2010). India is among the world's leading producers of many important agriculture commodities such as rice, wheat, sugarcane, potatoes, groundnuts, fresh vegetables and fruits. There are around 20 agro-ecological regions in the country that support over 800 crop species across all major groups (MoEF, 2009b). India is also a major contributor to the world's repertoire of food plants. An estimated 166 species of crops, about 6.7 percent of global crop species, are believed to be of Indian origin (MoEF, 2011c). India is one of the eight Vavilovian centres of origin of cultivated plants in the world (see Table 2.1).

b) Livestock diversity

With nearly 530 million livestock and 650 million poultry, India is a major producer of animal husbandry products (DAHDF, 2011). For example, it is the largest milk producing country in the world (Vyas, 2007). India is considered an important livestock domestication centre and the genetic diversity of its livestock is reflected in

TABLE 2.1: Crop types and their number of wild relatives in India

Crop(s)	Number of wild relatives
Cereals and millets	46
Pulses	81
Fruits	91
Spices and condiments	28
Vegetables	76
Fibre crops	15
Oilseeds	14
Miscellaneous plants	28
Total	379

Source: MoEF, 2008.

the broad spectrum of native breeds (MoEF, 2009b). India has as many as 42 breeds of sheep, 30 of cattle and 20 of goats (see Table 2.2).

TABLE 2.2: India's native breeds of domesticated animals

Animal	Number of breeds
Cattle	30
Buffalo	10
Sheep	42
Goat	20
Camel	9
Horse	6
Donkey	2
Poultry	18
Total	137

Source: MoEF, 2008.

Endemism

An important feature of India's biodiversity is its high level of endemism. Among faunal groups, one group (Mesozoa) shows 100 percent endemism. Other invertebrate taxa that show high degree of endemism include Acanthocephala (88.64 percent), Oligochaeta (77.80 percent) and Platyhelminthes (71.88 percent). Among vertebrates, Amphibia (61.24 percent) and Reptilia (47 percent) are noteworthy (see Annexure 5). Among floral groups, the highest level of endemism is seen in Angiosperms (35.3 percent), followed by Algae (26.8 percent), Bryophytes (25.1 percent), Fungi (24.0 percent) and Lichens (23.7 percent) (see Annexure 6). Further, nearly 60 percent of the world's tigers, 65 percent of Asian elephants, 80 percent of one-horned rhinoceros, 80 percent of gharials and 100 percent of Asiatic lions are found in India (NFC, 2006).

While the above two sections provide a fairly detailed account of India's ecosystems and species diversity, in order to better understand the country's biodiversity heritage, it is necessary also to consider its third pillar, viz., India's conservation ethos. The next section discusses this.

Cultural heritage: conservation ethos

India has a rich cultural heritage that is recognized for its respect and compassion for all life-forms. The conservation ethos has been intricately embedded in Indian culture throughout its recorded history. *Tapovanas* and *Abhayaranyas* (conservation zones of ancient times) are testimony to this. India has as many as 91 eco-cultural zones, inhabited by over 4,500 community groups (MoEF, 2011c). Numerous community groups across the length and breadth of India have rich traditions of protection of specific ecosystems or particular components of biodiversity. For many, such as the *Bishnoi* community of Rajasthan, conservation is a way of life (see Box 2.3).

India has a vast network of community conserved areas (CCAs) and sacred groves (SGs). These are natural and/

BOX 2.3: Conservation ethos of the *Bishnoi* community

The *Bishnoi* people of Rajasthan worship nature in all its manifestations. They do not cut living trees and collect only dead and fallen wood for their use. A major incident highlighting the extent of their commitment to nature and conservation happened in 1730 A.D. when the local king ordered felling of a large number of khejri (*Prosopis cineraria*) trees to obtain timber for building his fortress. The *Bishnoi* initially pleaded with soldiers who had come to fell the trees to spare them. However, when the soldiers did not relent, many *Bishnois* hugged trees, faced the axe and as many as 363 of them laid down their lives.

The *Bishnoi* community also passionately protect wild animals and most of its members are vegetarians. Herds of wild animals such as Spotted deer, Black buck and Blue bull can be seen foraging fearlessly near *Bishnoi* villages. Such is their commitment to conservation that even if their agriculture crop is damaged by wild animals, they do not chase them away.



Photo: Ashis Gharai

Source: MoEF, 2008.

or modified ecosystems containing significant biodiversity values, which are voluntarily conserved by communities for cultural, livelihood or other reasons. Hundreds of such sites have been documented and as documentation efforts progress, more are being discovered. These sites are known by different names locally, such as *Lawkyntang* in Meghalaya, *Devithans* in Sikkim, *Devara Kadus* in Karnataka, *Kavus* in Kerala and *Orans* in Rajasthan. It is estimated that the area under CCAs is comparable to the size of the formal protected area network in the country (Pathak, 2009). The estimated number of SGs is between 100,000 and 150,000 (Malhotra, 1998).

India is also rich in traditional knowledge related to sustainable use of biological resources. Nearly 275 million poor people in India depend on NTFPs for subsistence and livelihoods (World Bank, 2006). This dependence is particularly crucial for around half of India's 89 million tribal people, who reside in forests or forest-fringe areas. Around 3,000 plant species are estimated to yield NTFPs and there are some NTFPs of animal origin as well (UNDP, 2011a).

The traditional Indian systems of medicine such as *Ayurveda*, *Unani* and *Siddha* also make extensive use of medicinal and aromatic plants sourced from forests. It is estimated that there are over 1.5 million practitioners of these systems and such medicines account for 70 percent of the formal medicine market in India (MoEF, 2009a). According to one assessment, around 2,000 plant species have medicinal value and 1,300 are known for their aroma and flavour (*ibid*). Another estimate puts the number of medicinal plants in use at over 6,500 (MoEF, 2009b). The National Medicinal Plants Board estimates that 6,000 to 7,000 plants have medicinal use in folk and documented systems of medicine. Out of these, around 960 species are traded actively and 178 have annual consumption levels in excess of 100 metric tons.⁹

Indian farmers are known to have a vast repository of traditional knowledge associated with agricultural crops. Over centuries, farmers have developed over 50,000 traditional varieties of rice, 5,000 of sorghum and 1,000 of mango (UNDP, 2011b). Many civil society groups are working alongside communities to document, preserve or revive biodiversity-friendly traditional practices.

Major threats and challenges

India's biodiversity faces a range of direct and indirect threats and challenges. The magnitude of these threats and challenges is very high, with as many as a third of all endemic species (faunal as well as floral) facing the threat of extinction (NFC, 2006).

Threats

The key threats confronting India's biological resources are similar to the ones faced globally, viz., 1) habitat loss, fragmentation and degradation; 2) unsustainable use and overexploitation; 3) pollution; 4) invasive alien species; and 5) climate change and desertification.

Habitat loss, fragmentation and degradation

Habitat loss, fragmentation and degradation are the main threats to India's biodiversity. Land is under considerable pressure, as the country supports around 17 percent of the world's population on less than 2.5 percent of global land area. In order to support this large population, around 42 percent of the country's geographical area has already been put under agriculture (Planning Commission, 2010). Although at 21 percent of the geographical area, India has a respectable forest cover, dense forests are restricted to only around 12 percent (FSI, 2011). In many places, forests have been fragmented due to expansion of developmental activities.



Photo: Foundation for Ecological Security



Photo: N.A. Naseer

In the Western Ghats, large tracts have been converted into monoculture plantations such as coffee and rubber (MoEF, 2009b). Repeated fires caused by humans not only adversely affect particular species (such as ground-nesting birds) but also over a period of time change the character of the ecosystem, for example, causing a regime shift from wet evergreen forests to semi-evergreen forests (NFC, 2006). Widespread encroachment of common lands has considerably reduced the extent of grasslands (Bhise, 2004). Many wetlands are facing threats such as siltation, effluent discharge and changes in hydrological regime. Aquaculture, salt farming and restricted flow of fresh water are among the threats faced by mangrove ecosystems. Coral ecosystems are threatened by eutrophication from sewage and agriculture activities, dredging and sedimentation (MoEF, 2009b).

It is estimated that more than 45 percent of protected areas have public thoroughfares that divide them into smaller parts (NFC, 2006). Habitat loss, fragmentation and degradation have adversely affected a number of species, including endangered ones such as the Great Indian bustard found in the grasslands of western India



and the Lion-tailed macaque found in the Western Ghats. While the geographic range of the Asian elephant has shrunk by 70 percent since the 1960s (MoEF, 2011b), the gharial's habitat has been drastically altered in many places due to sand mining and construction of dams and barrages on rivers (MoEF, n.d.). Other fall-out of habitat loss and fragmentation include human-animal conflict and shrinking genetic diversity (both wild and domesticated).

Unsustainable use and overexploitation

Unsustainable use and overexploitation are significant threats to India's biodiversity. There is considerable pressure on India's forests, particularly for fuel wood collection and livestock grazing. The National Forestry Action Programme (1999) estimated that fuel wood accounted for around 40 percent of the country's energy needs, and its consumption was about five times higher than what could be sustainably removed from the forests. Around 60 percent of the country's livestock grazed in the forests and 67 percent of the National Parks and 83 percent of the Wildlife Sanctuaries were also affected by

grazing (MoEF, 1999). There is also tremendous grazing pressure on the grasslands, with serious implications for the survival of many endangered species such as Pygmy hog and One-horned rhinoceros (MoEF and ZSI, 2011). Increased water abstraction from wetlands and rivers is also a threat to many species, particularly those with restricted distribution such as Sociable lapwing (*Vanellus gregarious*) (MoEF, 2009b). Commercially valuable wild species are particularly vulnerable. Nearly 90 percent of the medicinal plants in trade are harvested from the wild (MoEF, 2008). The beautiful Peacock spider (*Poecilotheria metallica*) is critically endangered, partly on account of its high demand in the illegal pet trade (MoEF and ZSI, 2011). Unsustainable fishing practices are a major cause of biodiversity loss in both freshwater and marine ecosystems. The body parts and derivatives of many wild faunal and floral species – such as rhinoceros horn, tiger parts, elephant ivory, shahtoosh (wool made from underfur of the Tibetan antelope (*Pantholops hodgsonii*), agarwood (*Aquilaria spp.*), sandalwood (*Santalum album*), musk from Musk deer (*Moschus moschiferus*) and bear bile – have great demand in the clandestine international market.

Pollution

Pollution – both point and nonpoint-source – is a serious threat to biodiversity. Its major causes are rapid industrialization and increasing use of fertilizers and pesticides. For example, consumption of fertilizers in India increased from 69.8 kg per hectare in 1991 to 113.3 kg per hectare in 2006, an increase of over 62 percent (MoEF, 2009a). Many areas have become contaminated with heavy metals and pesticides due to improper disposal of industrial effluents and municipal waste.

It is estimated that nearly 70 percent of India's surface water resources are contaminated by pollutants (*ibid*). Many species such as gharial, Siberian crane (*Grus leucogeranus*) and Gangetic river dolphin have been badly affected by pollution. Between 2007 and 2008, over 100 gharials in the Chambal River died from suspected consumption of contaminated fish (MoEF, n.d.). Rampant veterinary use of the drug diclofenac has resulted in the populations of three vulture species – White-backed vulture (*Gyps bengalensis*), Slender-billed vulture (*Gyps tenuirostris*) and Long-billed vulture (*Gyps indicus*) – declining by as much as 99 percent (MoEF and ZSI, 2011).

Invasive alien species

The threat from invasive alien species is considered second only to habitat loss, fragmentation and degradation. The major invasive alien plant species include *Lantana camara*, *Eupatorium odoratum*, *Eupatorium adenophorum*, *Parthenium hysterophorus*, *Ageratum conyzoides*, *Mikania micrantha*, *Prosopis juliflora* and *Cytisus scoparius*. Invasive climbers like *Mikania* have overrun and strangled native species in the Himalayas and the 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. Among invasive animal species, introduced fishes such as Bighead carp (*Hypophthalmichthys nobilis*), Silver carp (*Hypophthalmichthys molitrix*), Tilapia and African catfish (*Clarias gariepinus*) have adversely affected native fish fauna in many water bodies such as Govind Sagar Lake (Himachal Pradesh) and Vaigai Reservoir (Tamil Nadu) (MoEF, 2008).

Climate change and desertification

Climate change and desertification are emerging as serious threats to biodiversity. Impacts of climate change are likely to be particularly adverse for biodiversity-rich forests, wetlands and coastal ecosystems. Two key aspects of climate variability that are likely to have a direct and significant impact on India's biodiversity are variation in precipitation and temperature. It is estimated that every 1° Celsius rise in temperature will lead to shifting the zone of occurrence of several specialist species by 160 m vertically and 160 km horizontally (to reach similar ecosystem conditions) (Thuiller, 2007). Though the exact impact of climate change on India's natural resources is yet to be studied in detail, pioneering studies show that endemic mammals like the Nilgiri tahr face an increased risk of extinction (Sukumar *et al.*, 1995). Further, there are indicative reports of certain species (e.g., Black-and-rufous flycatcher (*Ficedula nigrorufa*) shifting their lower limits of distribution to higher reaches, and sporadic dying of patches of Shola forests with the rise in ambient surface temperatures.¹⁰



Photo: Samej Pragati Sahayog

In addition to climate change, India also faces the threat of desertification. Around 69 percent of India's geographical area could be classified as dry land (arid, semi-arid and dry sub-humid). Remote sensing data indicate that around 32 percent of the country's geographical area (c. 105 million hectares) is undergoing the process of land degradation. The three main processes contributing to desertification are water erosion, vegetal degradation and wind erosion (SAC, 2007). Threats to ecosystems and species are addressed through the identification of biodiversity 'hotspots' and 'Red Lists'. As many as four globally identified

TABLE 2.3: Major threats to India's biodiversity and their causes

Threat(s)	Underlying/ root cause (s) ¹¹	
<p>Habitat Loss, Fragmentation and Degradation</p>	<p>Increasing demand for natural resources such as land, water and minerals; mega-development projects such as dams, roads and mines; lack of integrated planning at landscape level; lack of proper economic valuation of biological resources.</p>	
<p>Unsustainable Use and Overexploitation</p>	<p>Increasing demand for natural resources to support economic growth; increasing market-led consumption of biological resources; expansion of infrastructure such as roads, dams and mines; increasing human population, and prevailing poverty.</p>	
<p>Pollution</p>	<p>Increasing industrialization and urbanization; lack of investment in appropriate technology; weak implementation of environmental laws; poorly-targeted subsidies.</p>	
<p>Invasive Alien Species</p>	<p>Inadequate monitoring and response systems; weak quarantine systems; insufficient control and management programmes.</p>	
<p>Climate Change and Desertification</p>	<p>Increase in consumption-oriented lifestyles across the world; faulty land management practices; inadequate global action to combat climate change.</p>	

Photo: Suresh Elamon

Photo: M. Balan

Photo: Tom Pietrasik

Photo: C. Sasikumar

Photo: M. Balan

biodiversity 'hotspots', viz., Eastern Himalayas, Indo-Burma, Western Ghats and Sri Lanka and Sundaland, fall wholly or partly in India. As per the IUCN Red List (2008), India has 2.9 percent (246) of the globally threatened floral species and 4.9 percent (413) of the globally threatened faunal species (MoEF, 2009b). Table 2.3 shows major threats to India's biodiversity and their causes.

Challenges

In addition to the above-mentioned threats, India faces several challenges in biodiversity governance. Two key challenges are related to the knowledge base for biodiversity conservation and the linkage and expansion of protected areas.

There is lack of a comprehensive information base on biodiversity, with only 70 percent of the country's land area surveyed so far (MoEF, 2009b). A shortage of qualified taxonomists for carrying out taxonomic studies in the country has hampered the survey process. For instance, some groups, such as soil microorganisms and marine flora and fauna, have not been sufficiently studied. Similarly, there is inadequate understanding of genetic diversity.

Conservation planners often need to choose between 'single large or several small' protected areas. Due to land scarcity and population pressure, planners in India have often chosen in favour of a large number of relatively small protected areas. These are not always large enough to support viable populations of threatened fauna, and fragments of forest are vulnerable to fire and edge-effects. Creating corridors to expand and connect protected areas is crucial for long-term conservation success, to facilitate gene flow and also to respond to potential range shifts due to climate change. However, areas between protected areas are currently undergoing rapid changes in land use, which result in loss or degradation of natural habitat.

It is also increasingly difficult to expand the protected area network (especially National Parks and Wildlife Sanctuaries) on account of a perceived conflict between protected areas and local people's dependence on them for livelihoods. The need for expansion of the protected area network can be illustrated through an example. Out of 463 Important Bird Areas (IBAs) identified in the country, as many as 199 (43 percent) are not officially protected (NFC, 2006).

Other key challenges pertain to insufficient human resources, insurgency or unrest in some parts of the country, inadequate financial resources and equipment, increasing human-animal conflict due to relatively small protected areas and rising human populations, adverse impact of tourism in some areas, indiscriminate use of fertilizers and pesticides, lack of documentation of traditional knowledge pertaining to biodiversity and lack of proper economic valuation of biodiversity in the national accounting process (NFC, 2006; MoEF, 2008, 2009b).

Policy and legal framework

Realizing the importance of conservation and sustainable use of biodiversity as well as fair and equitable sharing of benefits arising out of it, India has developed a relatively robust legislative and policy framework for biodiversity governance. Although some measures date back several decades,¹² concerted action on this front started from the 1970s onwards. This section provides an overview of the biodiversity governance systems in the country.

The idea of protection of the environment, including biodiversity, is enshrined in the Constitution of India. It enjoins both the State and the citizens to take appropriate steps in this direction. Article 48-A of the Constitution of India states that '[t]he State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country', and Article 51-A (g) states that '[i]t shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures'.

The policy framework for biodiversity governance comprises a number of sector-specific and cross-sectoral policy statements issued over the years. Some of the key policy statements are: (i) National Forest Policy, 1988; (ii) National Conservation Strategy and Policy Statement on Environment and Development, 1992; (iii) National Policy and Macro-level Action Strategy



Photo: Foundation for Ecological Security

on Biodiversity, 1999; (iv) National Agriculture Policy, 2000; (v) National Seeds Policy, 2002; (vi) National Water Policy, 2002; and (vii) Comprehensive Marine Fishing Policy, 2004.

In 2006, India brought out a comprehensive policy statement, the National Environment Policy, to 'infuse a common approach' and to achieve 'balance and harmony between economic, social and environmental needs of the country'. It 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'.¹³

The crucial laws that provide the legal framework for biodiversity governance include: (i) the Indian Forest Act, 1927; (ii) the Wildlife (Protection) Act, 1972; (iii) the Forest (Conservation) Act, 1980; (iv) the Environment (Protection) Act, 1986; (v) the Panchayats (Extension to the Scheduled Areas) Act, 1996; (vi) the Protection of Plant Varieties and Farmers' Rights Act, 2001; (vii) the

Biological Diversity Act, 2002; and (viii) the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006.

The Indian Forest Act regulates the declaration, protection and management of forest lands. The Forest (Conservation) Act provides for prior approval of the central government for diversion of forest lands for non-forestry purposes. The Environment (Protection) Act empowers the central government to take various measures for improving the quality of the environment and prevention, control and abatement of environmental pollution. Two important measures introduced under this Act are the requirement to conduct Environmental Impact Assessment (EIA) for specified projects, and regulation of specified activities in the coastal zone. The Protection of Plant Varieties and Farmers' Rights Act provides for the establishment of an effective system for protection of plant varieties and rights of farmers and plant breeders. Although all the above laws are important,¹⁴ the two most relevant, from the perspective of biodiversity governance, are the Wildlife (Protection) Act and the Biological Diversity Act. While the Wildlife (Protection) Act focuses on conservation of biodiversity and establishment of protected area network, the Biological Diversity Act focuses on sustainable use and fair and equitable sharing of benefits arising out of the use of biological resources and related knowledge.



Photo: M. Balan

Apart from the statements and legislations, other important components of the policy and legal framework are 'Action Plans'. The three major Action Plans relevant to biodiversity governance are the National Forestry Action Programme (1999), the National Wildlife Action Plan (2002-2016) and the National Biodiversity Action Plan (2008). Although a number of government agencies work on different aspects of biodiversity governance, the nodal agency for planning, promoting, coordinating and overseeing implementation of policies and programmes related to biodiversity governance at the national level is the Ministry of Environment and Forests (MoEF). At the state level, Forest Departments play a crucial role.

Policy background to *in-situ* conservation

India has undertaken a range of conservation measures to protect its biodiversity, including *ex-situ* and *in-situ* measures. The major measures taken for *in-situ* conservation are discussed in this sub-section. As mentioned earlier, the cornerstone of *in-situ* conservation in the country is its vast protected area network. There are four main categories of protected areas, *viz.*, National Parks, Wildlife Sanctuaries, Conservation Reserves and Community Reserves. Both National Parks and Wildlife Sanctuaries are areas with significant ecological, faunal, floral, geomorphological, natural or zoological features. The main difference between the two lies in the rights of the people living inside them – while certain use rights can be allowed inside a Sanctuary, no rights are allowed in a National Park. Conservation Reserves can be declared by the state government in any area owned by the government, particularly the areas adjacent to National Parks and Sanctuaries and those areas which link one protected area with another. The rights of people living inside a Conservation Reserve are not affected. Community Reserves can be declared by the state government on any private or community land, not comprised within a National Park, Sanctuary or Conservation Reserve, where an individual or community has volunteered to conserve wildlife and its habitat. As in the case of Conservation Reserves, the rights of people living inside a Community Reserve are not affected.¹⁵

Although the first protected area was constituted more than a century ago, the protected area network in the country was expanded considerably after the enactment

of the Wildlife (Protection) Act in 1972. By 1988, there were 54 National Parks and 372 Wildlife Sanctuaries covering a total area of 109,652 km². By 2000, the network had expanded to 153,000 km² or 4.66 percent of India's geographical area (NFC, 2006). At present, India has a network of 668 protected areas comprising 102 National Parks, 515 Wildlife Sanctuaries, 47 Conservation Reserves and four Community Reserves (MoEF, 2012). The protected area network extends over 16.1 million hectares or 4.9 percent of the country's geographical area. While many protected areas are focused on terrestrial fauna, some have been established mainly to protect marine habitats or plants such as wild citrus, rhododendrons and orchids (MoEF, 2001). By and large, these protected areas are managed through 'the ecosystem approach' with a core-buffer strategy for conservation.

Apart from the four main categories of protected areas listed above, there are other, often overlapping, categories as well. There are 18 Biosphere Reserves, of which so far seven have been included in the UNESCO World Network of Biosphere Reserves (see Table 2.4). Also 25 wetlands have been declared as Ramsar sites and six protected areas have been designated by UNESCO as World Heritage Sites.

Other categories of biodiversity-rich areas requiring conservation focus have also been established under different national laws. Six areas – Matheran, Mahabaleshwar-Panchgani, Murud-Janjira, Mount Abu, Sultanpur and Dahanu Taluka – have been declared as 'ecologically sensitive areas' under the Environment (Protection) Act, 1986. Three sites in Karnataka have

TABLE 2.4: Indian Biosphere Reserves in the World Network of Biosphere Reserves

Biosphere Reserve	State(s)
Nilgiri	Tamil Nadu, Kerala and Karnataka
Gulf of Mannar	Tamil Nadu
Sunderbans	West Bengal
Nanda Devi	Uttarakhand
Pachmarhi	Madhya Pradesh
Simlipal	Odisha
Nokrek	Meghalaya

been recently notified as 'Biodiversity Heritage Sites' under the Biological Diversity Act (MoEF, 2012).

Although the formal protected area network covers around 4.9 percent of the country's geographical area, the actual extent of area under conservation is significantly higher. For example, many reserved and protected forests outside the protected area network are managed with conservation as an important objective (see Chapter 5). A significant proportion of the coastal zone has been offered protection under the Coastal Regulation Zone notification¹⁶ issued under the Environment (Protection) Act, 1986.



Photo: N. A. Naseer

India has special schemes for conservation of vulnerable ecosystems. Thirty-eight mangrove areas and four coral reef areas have been identified for intensive conservation and management. The National River Conservation Plan covers 39 rivers and considerable efforts have been made to improve water quality through pollution abatement. Under the National Lake Conservation Plan, projects for conservation of as many as 61 lakes have been taken up since 2001. Under the National Wetlands Conservation Programme, 115 wetlands have been identified for conservation (MoEF, 2012). *In-situ* conservation of medicinal plants is being undertaken by a number of government agencies and NGOs. Around 55 Medicinal Plant Conservation Areas (MPCAs) have been established across five states covering an area of 11,000 hectares (MoEF 2009b). The central government runs a programme (Integrated Development of Wildlife Habitats) that *inter alia* provides support for protection of wildlife outside the protected areas. In addition to these efforts, there are several documented autonomous community efforts as well. If all these areas are also considered, it is estimated that as much as a fifth of the country would be under active conservation (MoEF, 2009b).

Apart from conserving critical habitats through the protected area network, another important strategy adopted is species-focused conservation. The two flagship schemes are Project Tiger and Project Elephant. Started in 1973, Project Tiger aims to ensure maintenance of a viable population of tigers in India. The core area of Tiger Reserves now covers almost one percent of the geographical area of the country. In 2006, the National Tiger Conservation Authority (NTCA) was set up to further strengthen tiger conservation efforts. Project Elephant was launched in 1992 to protect elephants, their habitat and migratory routes and to address the issues of human-animal conflict. At present, there are 41 Tiger Reserves and 32 Elephant Reserves in the country. In addition to tiger and elephant, recovery programmes for 15 other critically endangered species have also been launched recently. These include Asiatic lion, One-horned rhinoceros, Snow leopard, Asian wild buffalo, Malabar civet (*Viverra civettina*), Edible nest swiftlet (*Aerodramus fuciphagus*), Hangul (*Cervus eldi eldi*), Nilgiri tahr, Manipur brow-antlered deer (*Rucervus eldii eldii*) and Swamp deer. Since 1983, India is also a Party to the Convention on Migratory Species (CMS) and has signed a Memorandum of Understanding for the conservation and management of migratory species such as Siberian cranes, Marine turtles and Dugongs



Photo: Foundation for Ecological Security

(*Dugong dugon*). Further, a Wildlife Crime Control Bureau has also been set up to combat illegal trade in wildlife (MoEF, 2009b, 2012).

A number of other steps taken up by the government since the 1970s have indirectly contributed to *in-situ* conservation. These include legislative measures such as the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981. These legislations – though not directly related to biodiversity – have helped the cause of biodiversity conservation by controlling pollution and habitat degradation. Another important measure initiated in 1999 includes the launch of All India Coordinated Project on Capacity Building in Taxonomy (AICOPTAX). This project has helped in addressing a major constraint, i.e. lack of adequate skilled human resource in the field of taxonomy. The project has helped to fill critical gaps in taxonomic knowledge (MoEF, 2010).

The Indian judiciary has played a proactive and facilitative role in environmental protection, including biodiversity conservation. The courts have elaborated and interpreted various provisions of extant legislation. An important contribution has been widening the scope of Article 21 of the Indian Constitution (right to life and personal liberty) to include environmental quality. The courts have given various orders such as regulation of tree felling and a ban on mining in specific areas (e.g. parts of the Aravalli hill range). The courts have also ruled on the need for an approved working plan for forestry operations, the collection of 'net present value' for diversion of forest lands for non-forest purposes, and the establishment of the Compensatory Afforestation Fund Management and Planning Authority (CAMPA). 'Public Interest Litigation' – i.e., litigation for the protection of public interest, has played a key role in judicial intervention in environmental issues.¹⁷

Sustainable use and fair and equitable sharing

Sustainable use is the core theme of the National Environment Policy, 2006: 'The dominant theme of this policy is that while conservation of environmental resources is necessary to secure livelihoods and well-being of all, the most secure basis for conservation is to ensure that people dependent on particular resources



Photo: Foundation for Ecological Security

obtain better livelihoods from the fact of conservation, than from degradation of the resource' (National Environment Policy, 2006).

Several major initiatives have been taken to promote sustainable use. Since 1990, local communities have been encouraged to protect, regenerate, manage and use local forest resources through the Joint Forest Management (JFM) programme. The programme, with its core principle of 'care and share', has emerged as the largest community forestry programme in the world – with 1,18,213 community groups managing around 22.94 million hectares of forest lands (see Chapter 6). To begin with, the programme was supported by externally-assisted projects but was subsequently mainstreamed and provided budgetary support through the National Afforestation Programme administered by the National Afforestation and Eco-development Board (Planning Commission, 2007; Planning Commission, 2010) and the state plans.

Another major step has been the enactment of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, which aims to devolve powers over forest lands to local people. Under this Act, land titles totalling 1.8 million hectares¹⁸ have



been granted to forest-dwelling communities (MoEF and MoTA 2010). Efforts are currently under way to set up the Indian Forest Certification Council to promote forest certification in the country (MoEF, 2012).

In 2000, India set up the National Medicinal Plants Board to promote conservation as well as sustainable use of medicinal plants. This move came about with the recognition that sustainable use of natural resources is possible only if there is proper valuation of natural resources and ecosystem services. In order to fill this gap in knowledge, a major study has been launched by MoEF in collaboration with 'The Economics of Ecosystems and Biodiversity' (TEEB).¹⁹ Two other major developments pertinent to sustainable use are the establishment of a National Green Tribunal in 2010 and the proposed establishment of a National Environment Assessment and Monitoring Authority (MoEF, 2012). These measures are likely to further strengthen environmental governance in the country.

Two other laws are important from the perspective of ensuring fair and equitable sharing of benefits from components of biodiversity and related knowledge. The

Protection of Plant Varieties and Farmers' Rights Act, 2001 safeguards the interests of farmers and recognizes their contribution in making available plant genetic resources for development of new plant varieties. A dedicated 'Protection of Plant Varieties and Farmers' Rights Authority' was established for the implementation of this Act in 2001. The Biological Diversity Act, 2002 provides a framework for access to the country's biological resources and sharing the benefits arising out of such access and use. The National Biodiversity Authority (NBA) was established in 2003 and 25 states have established State Biodiversity Boards (SBBs) so far. It is estimated that there are 33,077 Biodiversity Management Committees (BMCs) across 19 states and 1,122 People's Biodiversity Registers (PBRs) have been prepared in 10 states.²⁰ Under a separate initiative, a digital database of traditional knowledge in the form of a 'Traditional Knowledge Digital Library' is also under preparation (MoEF, 2009b).

The country's biodiversity governance is likely to be further strengthened in the coming years as many actions planned under the ambitious National Action Plan on Climate Change (NAPCC, 2008) are likely to

BOX 2.4: Eight Missions of National Action Plan on Climate Change, 2008

- National Solar Mission
- National Mission for Enhanced Energy Efficiency
- National Mission on Sustainable Habitat
- National Water Mission
- National Mission for Sustaining the Himalayan Ecosystem
- National Mission for a 'Green India'
- National Mission for Sustainable Agriculture
- National Mission on Strategic Knowledge for Climate Change

Source: PMCCC, 2008.

have a positive impact on biodiversity (see Box 2.4). This is particularly true for NAPCC missions such as Green India, Sustainable Agriculture, Himalayan Ecosystem and Strategic Knowledge. With this massive forward thrust on environmental issues, it is hoped that the vision of the National Environment Policy to mainstream environmental concerns, including biodiversity conservation, in all development activities will become a reality.

Following this overview of India's biological resources and the broad enabling environment for biodiversity conservation, sustainable use and benefit sharing, we discuss the five Indian biodiversity governance models in the next five chapters.

Endnotes

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- ⁵ Based on United Nations Environment Programme, *State of the Environment India, 2001*; India, Ministry of Environment and Forests, *State of Environment Report India, 2009* (New Delhi, 2009); and India, Ministry of Environment and Forests, *India's Fourth National Report to the Convention on Biological Diversity* (New Delhi, 2009).
- ⁶ These are further sub-divided into 27 'biotic provinces' and nearly 200 'landforms'.
- ⁷ Also referred to as *Panthera uncia*.
- ⁸ Such as Tetracentraceae, Hamamelidaceae, Circaeasteraceae, Butomaceae, Stachyuraceae, Berberidaceae, Saxifragaceae and Orchidaceae.
- ⁹ India, Ministry of Health and Family Welfare, National Medicinal Plants Board (Available from <http://nmpb.nic.in/>. Accessed 10 May 2012).
- ¹⁰ United Nations Development Programme, 'Stakeholder Consultations at Munnar, Kerala September 2011 under the GEF-UNDP-UNDP India Mountain Landscape Programme'.
- ¹¹ This is an illustrative rather than comprehensive list.
- ¹² For example, the Indian Board for Wildlife was constituted as early as 1952 to advise the government on wildlife conservation measures (NFC, 2006).
- ¹³ India, Ministry of Environment and Forests, 'National Environment Policy, 2006' (New Delhi, 2006).

- ¹⁴ For example, the rate of diversion of forest lands for non-forestry purposes fell from around 165,000 hectares per annum (average for 25 years from 1951-1952 to 1975-1976) to approximately 36,300 hectares per annum after the enactment of the Forest (Conservation) Act, 1980 (various reports of MoEF).
- ¹⁵ India, Ministry of Environment and Forests, 'Protected Area Network in India' (Available from <http://moef.nic.in/downloads/public-information/protected-area-network.pdf>. Accessed 11 May 2012).
- ¹⁶ The most recent notification was issued in 2011.
- ¹⁷ The Indian Supreme Court allows any citizen to petition the Court on behalf of any other citizen or group of citizens for redressal of violation of any Constitutional or legal right. Even a simple letter written to the Court serves as a petition.
- ¹⁸ India, Ministry of Tribal Affairs (Available from <http://www.tribal.nic.in>. Accessed 17 May 2012).
- ¹⁹ India, Ministry of Environment and Forests, Press Brief dated 18 February 2011 (Available from <http://envfor.nic.in/downloads/public-information/2011-02-23%20Press%20Brief%20-%20TEEB%20India.pdf> Accessed 17 May 2012).
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Protected Areas – Reservoirs of Biodiversity

3

Protected areas cover around 4.9 percent of the country's geographical area – an impressive feat considering the limited availability of land per capita and growing pressures of development. India's protected area network is designed to represent a spread of biomes and ecosystems, as well as iconic species such as tiger and elephant. In conjunction with the ecosystem approach, administering protected areas and their surroundings is considered as an important tool for achieving Millennium Development Goals as millions of people depend on these lands for livelihood and sustenance. Society as a whole also benefits from the ecosystem goods and services generated by protected areas. A robust system of protected area governance is crucial for securing India's ecological security.



Introduction

The second half of the 20th century marked an important turn in the history of wildlife conservation in India. A number of decisive conservation actions were taken during this period that included the establishment of a large number of formal protected areas, the initiation of Project Tiger and Project Elephant, and the application of biogeographic classification as the basis for establishing a protected area network. It was during this period that the Indian Parliament passed the Wildlife (Protection) Act, 1972.

The first decade of the 21st century also witnessed several landmark initiatives aimed at consolidating protected area governance. These included adoption of the National Wildlife Action Plan (NWAP 2002-2016), delineation of eco-sensitive zones (ESZ) around

National Parks and Sanctuaries, establishment of the National Tiger Conservation Authority (NTCA), launch of recovery programmes for critically endangered species, enhanced focus on protection of wildlife outside protected areas, development of new protocols for estimating population of important wildlife species, introduction of IUCN Red List criteria, and Management Effectiveness Evaluation (MEE) of protected areas.

Over the years, protected area governance in India has evolved to accommodate varied baselines, contexts and challenges. The classic model of 'people-exclusive' protected area governance has given way to 'people-inclusive' governance. Protected areas are now considered an integral part of larger landscapes. This chapter traces the evolution of protected area governance in India and describes its origin, coverage, planning frameworks, innovative management approaches, effectiveness, challenges and the way forward.



Photo: Manoj Nair

Pre-independence conservation efforts

The notion of 'protected spaces' in India dates back to 300 BCE, for example, Kautilya's *Arthashastra*, an ancient Indian text, refers to *Abhayaranyas* or forest refuges. In the colonial era, several wildlife-rich areas were designated as protected areas. These included Vedanthangal Bird

Sanctuary (1858), Kaziranga National Park (1916), Kanha (Banjar Valley, 1933) and Corbett (Hailey National Park, 1936). This was largely due to the efforts of individual wildlife enthusiasts or hunter organizations rather than a conscious State-driven initiative (see Box 3.1). At the time of India's independence, there was no central legislation on protected areas. The Wild Birds and Animals Protection Act, 1912 accorded some protection to the birds and animals specified in the Schedule to the Act.

BOX 3.1: Protected areas of colonial origin

Kaziranga National Park, Assam: Having received attention in 1905 as the habitat of the Indian rhinoceros, Kaziranga has the distinction of being India's first notified protected area, as a Game Sanctuary since 1916. In 1950 it became a Wildlife Sanctuary, and subsequently in 1968, the Assam government declared it a National Park. In 1985, it became a World Heritage Site for its unique natural endowment. It is also a Tiger Reserve, with a core area of 625 km² and a buffer zone of 548 km², which is home to over 2,000 rhinos.



Photo: Vasu N.K.

Corbett National Park, Uttarakhand: Established in 1936 as Hailey National Park, it is the oldest National Park in India. Renamed after the legendary hunter-conservationist Jim Corbett, it became a Tiger Reserve in 1974. At present, Corbett Tiger Reserve has a core area of 822 km² and buffer zone of 466 km². Corbett Tiger Reserve has the highest density of tigers in the country.



Photo: M. Balan

Kanha National Park, Madhya Pradesh: First described by Captain Forsyth in the 1880s and Dunbar Brander in the 1920s, the Banjar Valley and Halon Valley segments of today's Kanha National Park were notified as Sanctuaries as early as 1933. The area was notified as a National Park in 1955. Kanha is also home to the Highland swamp deer or Barasinga (*Cervus duvaceli branderi*) that was saved from the brink of extinction between the 1960s and the early 1970s (from just 66 individuals to over 400 now). A Tiger Reserve since 1973, Kanha has grown to 917 km² that forms its core, besides a buffer zone of 1,134 km².



Photo: Joseph Vattakaven

Periyar Tiger Reserve, Kerala: Periyar lake owes its origin to the construction of the Mullaperiyar Dam in 1895. The dam was constructed to provide irrigation to the arid plains of Tamil Nadu (an adjoining state). The forests around the lake were declared as Periyar Lake Reserve Forests in 1899 and as Nellikkampetti Game Sanctuary in 1934. In 1950, the Game Sanctuary was expanded into Periyar Wildlife Sanctuary (777 km²) by adding the adjoining forests of Rattendon Valley and Mount Plateau. The area was brought under Project Tiger in 1978. The total area of Periyar Tiger Reserve is 925 km² including 881 km² as core and 44 km² as buffer.



Photo: Sanjay Kumar

Legal and policy framework for protected area governance

The Wildlife (Protection) Act, 1972 is the most important legislation on wildlife conservation in India. The Preamble of the Act enshrines 'to provide for the protection of wild animals, birds and plants and for matters connected therewith or ancillary or incidental thereto with a view to ensuring the ecological and environmental security of the country'. The Act prohibits hunting and provides for: protection and management of wildlife habitats; establishment of protected areas; regulation and control of trade in wildlife; management of zoos; appointment of wildlife authorities and Wildlife Boards; and prevention, detection and punishment of violations.

Other important pieces of legislation that have a bearing on wildlife conservation are the Indian Forest Act, 1927; the Forest (Conservation) Act, 1980; the Environment (Protection) Act, 1986; the Biological Diversity Act, 2002, and the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006.

India is also a signatory to major international conventions on wildlife conservation such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 1973), the International Convention for the Regulation of Whaling (IWC, 1946), the Convention on Biological Diversity (CBD, 1993) and the Convention on Migratory Species (CMS, 1979). Besides, India is a member of the International Union for Conservation of Nature (IUCN) and the UNESCO World Heritage Convention.

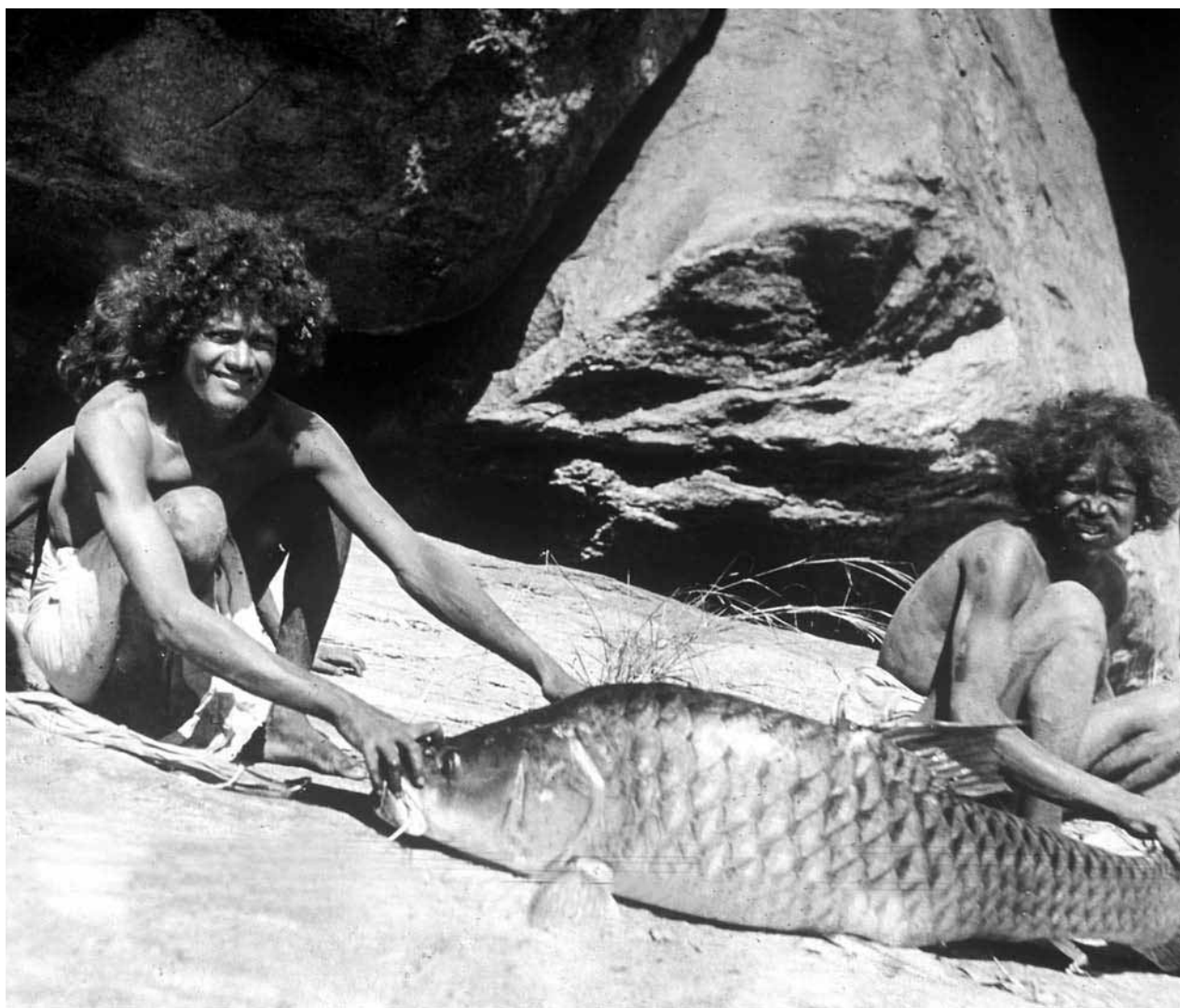


Photo: High Range Historical Collection

Categories of protected areas in India

Unlike the IUCN classification (detailed in Chapter 1), India has its own nomenclature for protected areas *viz.*, National Parks, Wildlife Sanctuaries, Conservation Reserves and Community Reserves. Each of these categories¹ has a specific origin and governance pattern, and serves distinct functions. The categories are outlined below:

National Park: This category accords the highest degree of protection to an area that has unique ecological, faunal, floral, geomorphological, natural or zoological significance, and is declared a National Park for the purpose of protecting, propagating or developing wildlife or its environment. All rights in National Parks are vested with the government.

Wildlife Sanctuary: A Wildlife Sanctuary is an area with ecological, faunal, floral, geomorphological, natural or zoological significance, which is protected for the purpose of propagating or developing wildlife or its environment. As opposed to a National Park, certain rights of people (e.g. grazing) are permitted in a Sanctuary.

Conservation Reserve: This category of protected areas is declared in any area owned by the state government, particularly those adjacent to National Parks and Sanctuaries, and those that link one

protected area with another for the purpose of protecting landscapes, seascapes, flora and fauna and their habitat. Conservation Reserves are declared after extensive prior consultations with local communities. The rights of people living inside a Conservation Reserve are not curtailed.

Community Reserve: These areas are declared by the state government on any private or community land, where an individual or community has volunteered to conserve wildlife and its habitat for the purpose of protecting fauna, flora and traditional or cultural conservation values and practices. As in the case of Conservation Reserves, the rights of people living inside Community Reserves are not affected.

Besides the above categories, there are Tiger and Elephant Reserves, which demarcate zones of wilderness or forest areas for the conservation of tigers and elephants. In formal parlance in India, however, the term protected areas normally implies National Parks, Wildlife Sanctuaries, Conservation Reserves and Community Reserves. This categorization does not include large areas of State-controlled territorial forests (see Chapter 5) and most CCAs (see Chapter 4). If these areas were also considered as protected areas (with varying degrees of conservation status as provided for in IUCN classification) then more than 20 percent of India's geographic area would fall under the formal network of protected areas.



Photo: Shailesh Nagar

Growth of protected area network

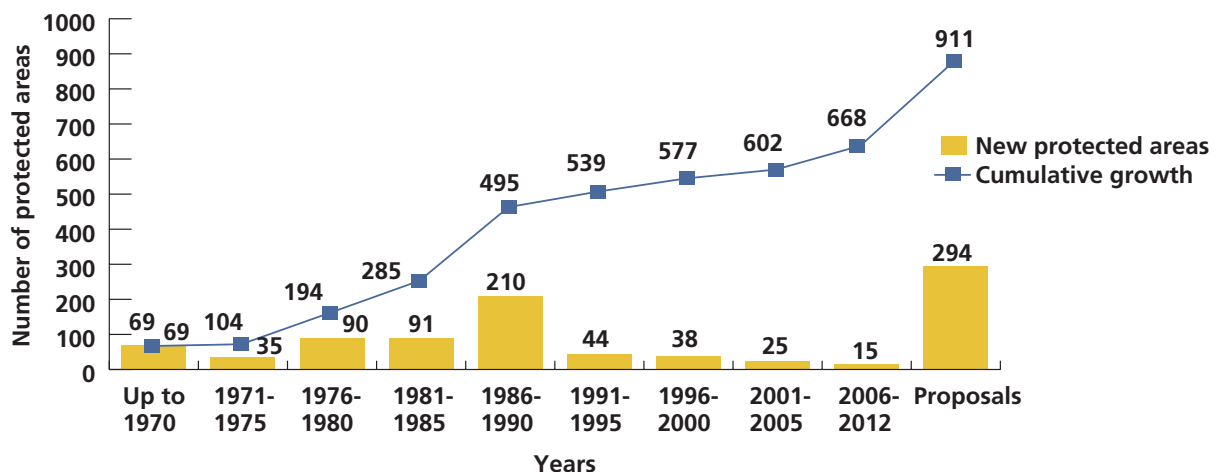
Most of India's pre-Independence protected areas were established in *shikargahs* (game reserves) of erstwhile *maharajas* or around catchments of reservoirs. Concern over shrinking forests and wildlife led to enactment of the Wildlife (Protection), Act in 1972 which essentially concentrated on identifying and protecting biodiversity-rich areas. Subsequently, the 1983 National Wildlife Action Plan set in motion a countrywide plan to establish a network of protected areas. This plan included, for the first time, the task of undertaking a biogeographic assessment, finding gaps and identifying new protected areas.

The biogeographic classification thus developed (Rodgers and Panwar, 1992; Rodgers *et al.*, 2000) recognizes 10 'Biogeographic Zones' encompassing 26 'Biotic Provinces' and nearly 400 'Landforms' (see Chapter 2). This approach had far-reaching consequences, and as a result, a large number of protected areas were established during this period. At present, India has a network of 668 protected areas – 102 National Parks, 515 Wildlife Sanctuaries, 47 Conservation Reserves and four Community Reserves covering an area of 161,222 km². Figure 3.1 shows the status of protected areas in the country as of 2012. A more detailed summary is provided in Annexure 7.



Photo: N.A. Naseer

FIGURE 3.1: Establishment of protected areas in India



Source: Wildlife Institute of India.

Excluding 4 Community and 47 Conservation Reserves

Planning framework

Biogeographic classification

Biogeographic classification forms the foundation of India's protected area planning. This planning framework was developed by the Wildlife Institute of India (WII) in 1986. WII facilitated a systematic review of the then existing protected area network, identified gaps in the representation of ecosystems and proposed new protected areas. Details of this classification were outlined in Chapter 2. The biogeographic classification has since undergone several reviews and upgrades (including criteria of selection of protected areas) that have helped in identifying gaps in forested and non-forest wilderness regions. Areas subsequently covered include glacial expanses, trans-Himalayan cold deserts, high altitude lakes, alpine pastures, coniferous forests, wet evergreen forests of North East India, coastal wetlands, coral reefs, sea turtle breeding beaches and numerous islands in the Andaman and Nicobar archipelago.

National Wildlife Action Plan

Under the National Wildlife Action Plan 2002-2016 (NWAP), India has turned its attention to strengthening and diversifying the management practices of protected areas. These include: conservation of endangered species and their habitats; restoration of degraded habitats outside the protected areas; control of poaching and illegal trade; research and monitoring; human resource development and personnel planning; and recognition of people's stake and their participation in conservation.

Other salient features of NWAP are conservation awareness and education; ecotourism; review and refinement of domestic legislation and response to international commitments; and development of a shared vision for conservation through convergence of the cross-sectoral programmes of various agencies. Besides, NWAP aims to bring 10 percent of the country's geographical area under the protected area network (MoEF, 2002), doubling its current size.



Photo: Manoj Chandran

Management planning in protected areas

Each protected area in India is managed as per a management plan prepared according to guidelines laid down in 'A Guide for Planning Wildlife Management in Protected Areas and Managed Landscapes' developed by WII. Prepared for a period of 10 years, these site-specific management plans outline strategies for bolstering biodiversity conservation, improving provisioning of ecosystem services and sustaining compatible livelihoods. Developed through extensive consultations with stakeholders, the management plans provide detailed guidance on enforcement strategies, staff deployment, habitat improvement practices, engagement with local communities, ecodevelopment, ecotourism, research, outreach, awareness, budgets etc.

One of the approaches emphasized in management planning is the adoption of a core-buffer strategy. While core areas are largely inviolate, coexistence is promoted in buffer areas. The buffer area is a multiple-use area with two objectives: 1) to supplement habitat for wild animals

that spill over from the core area, and 2) to provide site-specific ecodevelopment inputs for surrounding villages to reduce their impact on the core (MoEF, 2009b).

Management planning in Tiger Reserves: Tiger Conservation Plan

In 2007, NTCA issued detailed guidelines for the preparation of Tiger Conservation Plans (TCPs) for Tiger Reserves. The focus under this plan is to consolidate and strengthen source populations of tigers in Tiger Reserves and protected areas. This will help in managing source-sink dynamics by restoring habitat connectivity to facilitate dispersing tigers to repopulate core areas. The TCPs provide broad protection strategies, and for the buffer zone, a strategy for mainstreaming wildlife concerns in various production activities such as agriculture, irrigation, mining, plantations, and temple tourism. Mainstreaming wildlife conservation into production sectors would: 1) ensure habitat supplements in outer areas beyond the core, and 2) reduce possible interface conflicts between various production sectors and conservation (Gopal *et al.*, 2007).



Photo: Manoj Chandran

Institutional framework for protected area governance

National Board for Wildlife (NBWL): Formerly known as the Indian Board for Wildlife, NBWL is a multi-disciplinary body comprising government functionaries, NGOs, conservationists and ecologists. NBWL advises the government on wildlife conservation, illegal trade and poaching, management of protected areas, impact assessment of projects, and other related issues. Constituted under the Wildlife (Protection) Act, 1972, NBWL is chaired by the Prime Minister.

National government: At the national level, Ministry of Environment and Forests (MoEF) deals with wildlife conservation. The Wildlife wing in MoEF, headed by the Additional Director General of Forests (Wildlife), is responsible for formulating broad policies on wildlife conservation, providing financial and technical assistance to conservation programmes through various centrally sponsored schemes,² declaring Tiger Reserves and Elephant Reserves, enacting wildlife laws, negotiating international conventions and treaties, setting standards for zoos, regulating international trade in wildlife, promoting policy, research and capacity building.

National Tiger Conservation Authority (NTCA): The Authority is a statutory body established in 2006 by an amendment to the Wildlife (Protection) Act. Important functions of NTCA include: 1) evaluating and assessing various aspects of sustainable ecology in tiger-bearing habitats and disallowing ecologically unsustainable land use in them; 2) laying down normative standards for tourism; 3) measures to address human-animal conflict; 4) developing future conservation plans, estimation of tiger and prey populations, status of habitats, disease

surveillance, mortality surveys etc.; 5) approving and coordinating research and monitoring of tigers, co-predators, prey, habitat, and related ecological and socio-economic parameters; 6) supporting Tiger Reserve management in biodiversity conservation through ecodevelopment and people's participation; and 7) facilitating skills development of officers and staff of Tiger Reserves.³

Wildlife Crime Control Bureau (WCCB): The Bureau is the national agency to deal with wildlife crime. Established in 2007, WCCB complements the efforts of state governments and other enforcement agencies (see Box 3.2).

BOX 3.2: Functions of the Wildlife Crime Control Bureau

The functions of the WCCB, defined under Section 38 Z(1) of the Wildlife (Protection) Act, 1972 are:

Collection and collation of intelligence related to organized wildlife crime and dissemination to state and other enforcement agencies for immediate action, and establishment of a centralized wildlife crime data bank.

Coordination of actions by various officers, state governments and other authorities for the enforcement of the provisions of the Wildlife (Protection) Act, either directly or through regional and border units set up by the Bureau.

Implementation of obligations under the various international conventions and protocols that are in force at present, or which may be ratified or acceded to by India in the future.

Assistance to foreign countries and international organizations to facilitate coordination and universal action for wildlife crime control.

Development of infrastructure and capacity building for scientific and professional investigation into wildlife crime and assistance to state governments for successful prosecution.

Advice to government on wildlife crime that has national and international ramifications, and suggestions on changes in policy and law.

Source: <http://wccb.gov.in/functions.html>. Accessed 10 August 2012.

Photo: M. Balan



Other federal institutions empowered to prevent and investigate forest and wildlife offences include Indian Coast Guard, Border Security Force, Indo-Tibetan Border Police, Railway Police Force, Customs Bureau, Central Bureau of Investigation etc.

Central Zoo Authority (CZA): The Authority was created in 1992 to enforce minimum standards and norms for the upkeep and healthcare of animals in Indian zoos so that they complement and strengthen national efforts on the conservation of wild fauna. The National Wildlife Action Plan (2002-2016) emphasizes the role of zoos for *ex-situ* breeding of endangered species and their rehabilitation in the wild as per IUCN guidelines for reintroduction.



Photo: Ajay Kumar Saxena

State government institutions: The State Board for Wildlife, chaired by the state's Chief Minister, advises the state government on the selection and management of protected areas and other matters related to wildlife conservation. The state's Forest Department administers and manages forests and wildlife reserves. The Wildlife Department is the most important agency involved in the management of protected areas. Headed by the Chief Wildlife Warden, the Wildlife Department deals with wildlife offence, undertakes habitat enrichment activities, and conducts research, outreach and ecodevelopment programmes. To oversee day-to-day management, each protected area is also staffed by field formations (technical and administrative).

Ecosystem approach to protected area governance: flagship programmes

As mentioned earlier, protected area governance in India is guided by the ecosystem approach. The following section features three flagship conservation programmes that have adopted this approach.

Project Tiger

Launched in 1973, Project Tiger is one of the most successful conservation programmes in recent times. It aims at maintaining a viable tiger population in Tiger Reserves and other tiger-bearing habitats. An estimate of the tiger population in India at the turn of the century placed the figure at 40,000. Subsequently, the first-ever All-India Tiger Census was conducted in 1972, revealing the existence of only 1,827 tigers. Multifarious threats in the second half of the last century led to the progressive decline of viable tiger habitats. In 1969, serious concern was voiced about threats to wildlife and shrinkage of wilderness at the IUCN General Assembly held in Delhi. A year later, India imposed a ban on tiger hunting and in 1972 brought in the Wildlife (Protection) Act.⁴



Photo: Girish Kumar

Project Tiger triggered a revival of tiger habitats and the tiger population in India. However, it was implausible to sustain these gains without addressing the subsistence aspirations of local communities. This led to the implementation of plans and programmes, known popularly as ecodevelopment that mandated rural development inputs to reduce subsistence pressure on protected areas and rationalize resource use in the

buffer zones. Despite these initiatives, a number of Tiger Reserves were faced with depletion of buffer zones and hostility of people who were denied access to the more stringently protected core zones.

The last decade also witnessed increased incidence of tiger poaching. Sariska Tiger Reserve in Rajasthan, for example, lost all its tigers to poachers. In 2005, a Tiger Task Force (TTF) was instituted to revamp tiger conservation efforts. It identified poaching as a major cause for tiger decline and advocated securing critical tiger habitats. Reiterating the need to elicit support from local communities, TTF suggested several institutional reforms, with emphasis on enforcement, ecodevelopment, creation of NTCA, stringent punitive measures for wildlife crime, adoption of a rigorous methodology for estimation of the tiger population, notifying core and buffer zones for Tiger Reserves etc. At present, there are 41 Tiger Reserves in the country covering an area of over 42,000 km² (see Annexure 8). The following sections detail a few innovative practices adopted under Project Tiger.

“Tiger cannot be preserved in isolation. It is at the apex of a large and complex biotope. Its habitat, threatened by human intrusion, commercial forestry and cattle grazing must first be made inviolate”

*Late Mrs Indira Gandhi,
Prime Minister of India, on launching
Project Tiger (1973)*

Core and buffer areas in Tiger Reserves

Core or critical tiger habitats are required to be kept inviolate without affecting the rights of forest dwellers. In each state, core areas are notified by the government in consultation with an expert committee. The buffer area refers to the area peripheral to critical tiger habitats or the core area, where a lesser degree of habitat protection is required to ensure the integrity of critical tiger habitats with adequate opportunities for dispersal of tigers. Such areas also promote coexistence of wildlife and human activity. The limits of core and buffer areas are determined on the basis of scientific and objective criteria in consultation with the Gram Sabha and an expert committee (see Box 3.3 and Figure 3.2).



Photo: Sanjayan Kumar

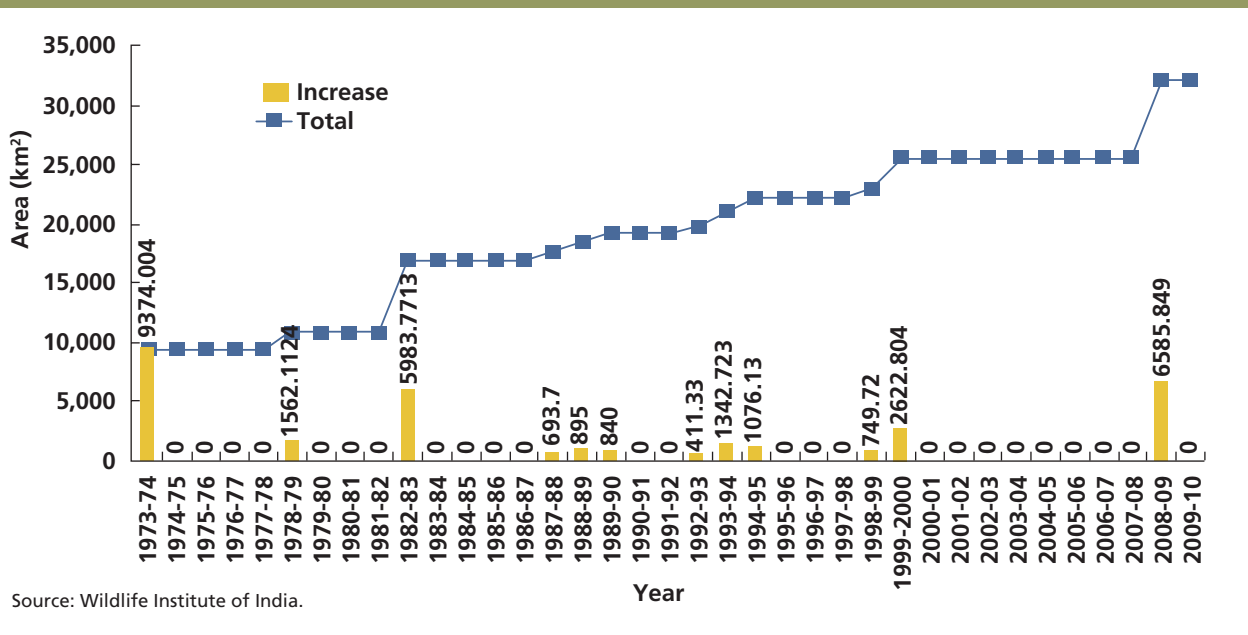
BOX 3.3: Principles of management of buffer areas of Tiger Reserves

The management of buffer areas is based on the following principles:

- Implementation of forestry activities after mainstreaming wildlife concerns.
- Implementation of ecodevelopment activities for reducing resource dependence of local people.
- Coordination with governmental/ non-governmental production sectors for mainstreaming conservation.
- Habitat management and activities aimed at improving existing habitat of tiger and its prey species.
- Reciprocal commitment by local people through specific measurable actions as per Memorandum of Understanding (MoU) for improving protection and conservation status of the area. This may include rationalization of resource use from the forests, participation in fire protection and anti-poaching efforts.
- Ecotourism activities in the buffer area for strengthening livelihoods of local people and protection of the area.
- Capacity building of field staff as well as Ecodevelopment Committee members to be undertaken regularly through Tiger Conservation Foundation.

Source: Gopal *et. al.*, 2007.

FIGURE 3.2: Total area of core/critical tiger habitats in Tiger Reserves



Methodology for estimation of tiger population

Since 2006 the country has, every four years, undertaken the All India Tiger Estimation exercise using a rigorous methodology. This method evaluates the status of tigers, co-predators and prey across tiger landscapes following a three-phased process:

Phase 1: Field data collection at the beat level (i.e. the primary patrolling unit) by trained personnel using standardized protocol.

Phase 2: Analysis of habitat status of tiger-bearing forests using satellite data.

Phase 3: Camera trapping to identify individual tigers based on their unique stripe patterns.

Using tiger numbers recorded in sampled sites, estimates for other contiguous tiger-occupied landscapes are also made. For this, additional information such as tiger signs, prey availability, habitat conditions and human disturbance are used. Final estimates provide a comprehensive and statistically valid result for the whole country (MoEF *et al.*, 2011). The outcome of the 2010 All-India Tiger Estimation is given in Annexure 9.

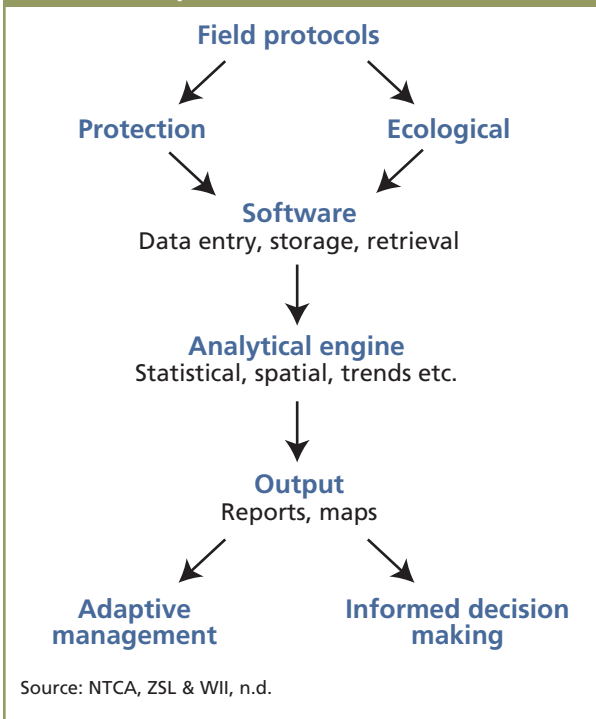
Monitoring System for Tigers – Intensive Patrolling and Ecological Status (MSTriPES)

India has started using MSTriPES, an innovative protocol for monitoring tiger habitats. MSTriPES provides for computer-assisted intelligent patrolling for law enforcement as well as seasonal ecological monitoring (see Figure 3.3). It uses the following data collection protocols within source populations: 1) carnivore sign encounters; 2) tiger prey encounters; 3) indices of human disturbance; 4) indices of habitat status; and 5) dung counts on plots (NTCA, ZSL & WII, n.d.). MSTriPES conducts statistical comparisons at desired spatial and temporal scales and produces outputs in the form of GIS maps and reports.



Photo: Girish Kumar

FIGURE 3.3: Schematic representation of the components of MSTRIPES



The advantage of MSTRIPES over other methods is that it generates information from regular duties of the park staff (e.g. patrols and ecological monitoring). It provides holistic assessment of the status of tigers, other carnivores, mega herbivores, prey, human pressures, illegal activities, and patrol efforts in a manner that monitors the health of the Tiger Reserve and provides inputs for adaptive management and evaluation of management effectiveness (Jhala *et al.*, 2011).

Tiger Conservation Foundation

Tiger Conservation Foundation (TCF) is a new institutional mechanism set up in Tiger Reserves under Section 38X of the Wildlife (Protection) Act, 1972. TCF aims to facilitate and support Tiger Reserve management by widening the constituency of support for conservation by involving a range of stakeholders. The Foundation is registered as a trust or society. It has a state-level Governing Body, apart from a field-level Executive Committee with representatives from local communities. The Foundation acts as a non-profit centre and as a development agency. It also leverages new and additional funding support to Tiger Reserve management through recycling of gate receipts, service charges, donations etc. The

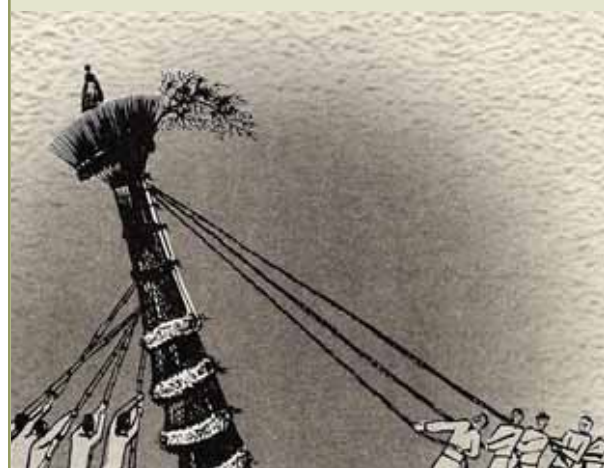
Foundation employs professionals with specialized skills. The Foundation also supports park management in activities such as ecodevelopment, staff welfare, visitor regulation, field research, developing resource-based sustainable business models, conducting capacity-building programmes, ecotourism etc. (Gopal *et al.*, 2007; Krishnan and Yadav, 2011) (see Box 3.4).

BOX 3.4: Ecodevelopment in Periyar Tiger Reserve, Kerala

Periyar Tiger Reserve (PTR) is managed in active collaboration with local communities. There are 76 Ecodevelopment Committees (EDCs), whose members include former poachers, cinnamon and black dammar collectors, fisherfolk, pilgrimage vendors, village women etc. They take part in management of the park including enforcement, monitoring and visitor management. For sustaining their livelihoods, various community-based ecotourism programmes have been developed. As a result of this collaboration, there is a marked decrease in wildlife crime, notable improvement in habitat quality and an overall resurgence in wildlife population. This has shown that protected areas can generate sustainable livelihoods while maximizing conservation gains.

In 2004, the Kerala government established Periyar Foundation to bolster conservation efforts in the Tiger Reserve. As an autonomous institution with broader stakeholder participation, the Foundation supports the Tiger Reserve in resource mobilization, research and monitoring, village ecodevelopment, education and awareness etc. The concept of Tiger Conservation Foundation was subsequently mainstreamed into the Wildlife (Protection) Act through an amendment in 2006.

Source: Nomination from Periyar Tiger Reserve for UNDP-Gol Biodiversity Awards, 2012.



Picture credit: Periyar Foundation

Management Effectiveness Evaluation of Tiger Reserves and protected areas

Management Effectiveness Evaluation (MEE) is the assessment of how well protected areas are managed and their effectiveness in conserving target flora and fauna. Management effectiveness focuses on three main themes: 1) design of individual sites and protected area systems; 2) adequacy and appropriateness of management systems and processes; and 3) delivery of protected area objectives including conservation values.

The IUCN World Commission on Protected Areas (WCPA) framework sees management as a process or cycle with six distinct stages, or elements: 1) it begins with establishing the context of existing values and threats; 2) progresses through planning; 3) allocates resources (inputs); 4) as a result of management actions (process); 5) produces goods and services (outputs); 6) that result in impact or outcomes. Of these elements, outcomes most clearly indicate whether the site is maintaining its core values. However, the outcome can also be the most difficult element to accurately measure, as an indicator of the effectiveness of management on the ground. Other elements of the framework are important in terms of identifying those areas where management needs to be adapted or improved. Thirty criteria (headline indicators) have been developed for MEE of Tiger Reserves for assessment of these six elements (See Box 3.5) (NTCA & WII, 2011).

For the MEE process, Tiger Reserves are grouped into seven landscape clusters. Wildlife Institute of India provides technical back-stopping for the whole process, and to ensure credibility for the assessment, independent experts are engaged. Considering the growing importance of addressing issues relating to climate change, two additional criteria have been added, including extensive field verification and consultations with stakeholders. India is also conducting the MEE process for protected areas falling outside Tiger Reserves.

Project Elephant

It is estimated that there are 26,000 wild and 3,500 domesticated elephants in India, which account for more than 60 percent of the world's population of Asian elephants.⁵ Due to their requirement of a large roaming area, elephants have suffered severely from the shrinkage, degradation and fragmentation of habitats. Current distribution of wild elephants in India is confined to south India; the North East states and West Bengal; Odisha and Jharkhand in the east; and Uttarakhand and Uttar Pradesh in the north-west (MoEF, 2010).

Project Elephant was launched in 1992 to protect elephants, their habitat and corridors, address the issue of human-animal conflict, and ensure the welfare of domesticated elephants. The Project is implemented in 14 states: Andhra Pradesh, Arunachal Pradesh, Assam, Jharkhand, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland, Odisha, Tamil Nadu, Uttarakhand, Uttar Pradesh and West

Photo: Suresh Elamon



BOX 3.5 Elements of the MEE framework and headline Indicators

Context	<ul style="list-style-type: none"> ● Are the values of the Tiger Reserve (TR) well-documented, assessed and monitored? ● Are the threats to TR values well-documented and assessed? ● Is the core area of TR free from human and biotic interference? ● Has the TR complied with the four statutory requirements?⁶
Planning	<ul style="list-style-type: none"> ● What is the status of tiger conservation plan (TCP)? ● Does the TR safeguard the threatened biodiversity values? ● Are stakeholders given an opportunity to participate in the planning process? ● Are habitat management programmes systematically planned, relevant and monitored? ● Does the TR have an effective protection strategy? ● Has the TR been effective in the mitigation of human-wildlife conflicts? ● Is the TR integrated into a wider ecological network/ landscape following the principles of the ecosystem approach?
Inputs	<ul style="list-style-type: none"> ● Are personnel adequate, well-organized and deployed with access to adequate resources in the TR? ● Are resources (vehicle, equipment, building etc.) adequate, well-organized and managed with desired access? ● Are financial resources other than those of the state linked to priority actions and adequate, released on time and utilized? ● Are financial resources from the state linked to priority action and adequate, released on time and utilized for the management of TR? ● What level of resources is provided by NGOs?
Process	<ul style="list-style-type: none"> ● Does the TR have resources trained in wildlife conservation for effective TR management? ● Is TR staff management performance linked to achievement of management objectives? ● Is there effective public participation in TR management and does it show in making a difference? ● Is there a responsive system for handling complaints and comments about TR management? ● Does TR management address the livelihood issues of resource-dependent communities, especially of women? ● Has the TR planned and implemented voluntary village relocation from core areas?
Outputs	<ul style="list-style-type: none"> ● Is adequate information on TR management publicly available? ● Are visitor services and facilities appropriate and adequate? ● Are research/ monitoring related trends systematically evaluated and routinely reported and used to improve management? ● Is there a systematic maintenance schedule and funds in place for management of infrastructure/ assets?
Outcomes	<ul style="list-style-type: none"> ● Are populations of threatened species, especially tiger populations, declining, stable or increasing? ● Have the threats to the TR being reduced/ minimized? Or is there an increase? ● Are the expectations of visitors generally met or exceeded? ● Are local communities supportive of TR management?

Source: NTCA & WII, 2011.

Bengal. Major activities carried out as part of Project Elephant include restoration of natural habitats and migratory routes of elephants; scientific management of elephant habitats; mitigation of human-elephant conflict; measures for protection of wild elephants from poachers; research; awareness; public education; ecodevelopment; and veterinary care.

In its two decades of existence, Project Elephant has set up 32 Elephant Reserves (see Annexure 10) in the country. In 2010, the Indian government constituted an Elephant Task Force (ETF) to review the Project and suggest measures to improve its effectiveness. In its recommendations, the ETF suggested the upgrading of legal and institutional frameworks and more accurate

identification of Elephant Reserves at the landscape level. It closely examined human-elephant conflict in different landscapes, and suggested practical measures for effective mitigation. The ETF also suggested improvements in the protocol for estimation and monitoring of the elephant population and development of more humane ways of looking after the domesticated elephants (MoEF, 2010).

Conservation of Asiatic lion

In the 19th century, the Asiatic lion was distributed widely across the scrub-savanna and dry deciduous forests of India – stretching from Gujarat in the west of India to Bihar in the east. However, it steadily lost ground to expanding agriculture and urbanization, except for some pockets in Saurashtra, Gujarat. By the mid-1880s, the population of lions in the Gir forests of Gujarat (its last abode at present) had fallen precariously to around 1,880 individuals (Singh & Kamboj, 1996).

The Gir Lion Sanctuary was notified in 1965 to protect the lion. As of now, the Greater Gir Lion Conservation Area comprising Gir National Park, Gir Wildlife Sanctuary, Girnar Wildlife Sanctuary, Pania Wildlife Sanctuary and other non-protected area forests, aggregates to just under 1,500 km² of protected area and a gross area of over 3,000 km² (MoEF, 2007). Concerted conservation efforts initiated in the 1970s continue, now with greater involvement of local people.

The current efforts also take into account conservation of lion habitats for their hydrological value, essential for farming in the peripheral areas and winning people's support. This approach has not only enhanced the prospects of lion conservation, but has also led to marked recovery of dry deciduous forests and scrub-savanna ecosystems. Within the Gir Conservation Area, the lion population has grown more than two-fold from 177 in 1968 to about 410 in 2010 (MoEF, 2007). Other conservation measures undertaken include relocation and rehabilitation of *maldharis* (livestock farming community living inside the protected areas), addressing human-lion conflict through timely compensation, and ecodevelopment support to local communities. The India Eco-development Project (implemented from 1996 to 2004 with GEF and World Bank as partners) was instrumental in eliciting people's support for lion conservation.

Coastal and marine protected area governance

India has a long coastline of about 7,500 km, an Exclusive Economic Zone (EEZ) of 2.02 million km² and a continental shelf of 468,000 km². It has extremely diverse coastal and marine ecosystems that include gulf waters, creeks, tidal flats, mud flats, coastal dunes, mangroves, marshes, wetlands, seaweed and sea grass beds, deltaic plains, estuaries, lagoons and coral reefs (UNDP, 2011). As per India's Fourth National Report to CBD (2009), more than 13,000 species of flora and fauna have been recorded from India's coastal and marine environment. There are 31 marine and coastal protected areas in the country including seven true representatives of marine protected areas viz., Malvan Marine Sanctuary (Maharashtra), Gulf of Mannar National Park (Tamil Nadu), Gulf of Kutch Marine National Park and Gulf of Kutch Marine Sanctuary (Gujarat), Mahatma Gandhi Marine National Park and Rani Jhansi Marine National Park (Andaman and Nicobar Islands) and Gahirmatha National Park (Odisha).

Production activities in coastal and marine areas – such as fishing, aquaculture, agriculture, tourism, oil and mineral exploitation – contribute about 10 percent to national GDP.⁷ India's coastal areas (less than 0.25 percent of the world's coastline) are also home to 63 million people, or



Photo: N. Vasudevan

BOX 3.6: Gulf of Mannar National Park and Biosphere Reserve

The Gulf of Mannar Biosphere Reserve, off the coast of the state of Tamil Nadu, has one of the world's finest assemblages of marine biodiversity, and provides sustenance to more than a quarter of a million people. The region was declared a Biosphere Reserve in 1989, the first such marine conservation area in south Asia. Over the past decade, the Reserve's globally-significant biodiversity was threatened by habitat destruction, over-harvesting of marine resources and civic pollution. Since 2002, a UNDP supported GEF funded project through the Government of India and Tamil Nadu's Department of Environment and Forests has demonstrated approaches on integrating biodiversity conservation with coastal zone management by minimizing fishing pressures, providing alternate livelihoods and promoting eco-friendly fishing practices. Some of the specific results achieved by the project include:



Photo: James Zacharias

- Increase in coral reef cover by five percent between 2005 and 2009 as a result of joint patrolling, community conservation initiatives and greater awareness of conservation needs.
- More than 2,000 self-help groups benefitting from a fund of US\$ 1.5 million for developing alternate livelihoods and enterprises.
- Policy support to government on governance of the coastal and marine region through comprehensive review of existing laws and policies.
- Setting up of EDCs in 248 coastal villages for promoting sustainable fisheries, alternate livelihoods and conservation.
- Generation of a sound knowledge-base for facilitating informed decision making through 24 research projects.
- Strengthening of Gulf of Mannar Biosphere Reserve by establishing an autonomous trust for cross-sectoral coordination in the region.

Source: UNDP, 2012.

approximately 11 percent of the global population living in low elevation coastal areas. Nearly 17 percent of this population lives in 73 coastal districts (out of a total of 593) and nearly 250 million people live within 50 km of the coastline. The coast also includes 77 cities and towns, including some of the largest and most dense urban agglomerations like Mumbai, Kolkata, Chennai, Kochi and Visakhapatnam (World Bank, 2010).

India's coastal and marine environment faces multiple threats. The change in land-use pattern (including urbanization), land-based pollution, extractive activities, excessive harvesting of resources, increasing occurrence of natural disasters, and climate change have all contributed to degradation of the coastal and marine environment. The poorest of the poor and the most vulnerable ecosystems bear the brunt of this continuing degradation.

India's coastal and marine protected area network, at present is inadequate to cover its representative biological diversity. So far, conservation efforts in the coastal and marine environment have been largely

focused on resolving the perceived dichotomy between conservation and livelihoods of local communities. India now has a number of win-win experiences that combine livelihood security and conservation. These include Gulf of Mannar National Park in Tamil Nadu (Box 3.6), Chilika Wildlife Sanctuary in Odisha, and Joint Mangrove Management Programme in Andhra Pradesh, Odisha and Tamil Nadu (MSSRF & UNDP, 2012). These experiences need to be replicated, scaled up and widely disseminated to help create a strong constituency for conservation of coastal and marine biodiversity.

Further efforts are underway for integrated planning of coastal areas (e.g. World Bank-assisted Integrated Coastal Zone Management Project) and also to mainstream biodiversity considerations into production sector operations (e.g. UNDP supported GEF funded India Coastal and Marine Programme). These are pioneering initiatives towards a new coastal and marine governance paradigm, based on spatial and cross-sectoral planning that takes into account the demands of conservation, sustainable development and local livelihoods.

Eco-sensitive zones around National Parks and Sanctuaries

The land use around many protected areas in India has undergone drastic changes in the recent past, mainly on account of industrial and infrastructure development. Sanjay Gandhi National Park abutting the sprawling metropolis of Mumbai (Maharashtra), Guindy National Park in the vicinity of Chennai (Tamil Nadu) and Bannerghatta National Park adjoining Bengaluru (Karnataka) are a few examples.

To stem this incursion, the government has decided to notify eco-sensitive zones (ESZs), i.e. areas that act as shock absorbers or transit zones. All activities in ESZs are envisioned as regulatory rather than prohibitive. As a general principle, the width of an ESZ is extendable up to 10 km around protected areas. Eco-sensitive zones are notified under the Environment (Protection) Act, 1986. Haryana was the first state in the country to notify an ESZ around Sultanpur National Park in 2010 (MoEF, 2011b).

Critical wildlife habitats and people's rights in protected areas

In 2006, India enacted the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 or Forest Rights Act (FRA), as it is popularly known. This Act extends people's rights over forests. However, FRA also recognizes areas of conservation significance (critical wildlife habitats) as inviolate. A critical wildlife habitat is determined and notified after an open process of consultation with the local community by an expert committee.

Apart from FRA, the Wildlife (Protection) Act, 1972 also provides for a process of settlement of rights of people in protected areas, continuance of some rights in the case of Sanctuaries, and due compensation where rights are extinguished. The process for settlement of rights for National Parks and Wildlife Sanctuaries is provided under Sections 19-25 of Wildlife (Protection) Act, 1972 (Sarkar, 2000; Broome, 2011).

Protection of wildlife outside protected areas

Since 2008, the central government has been providing financial and technical support to wildlife-rich areas existing outside protected areas through the Integrated Development of Wildlife Habitats programme. These include high-value biodiversity areas in territorial forests; CCAs and sacred groves; community and Panchayat forests; private forests such as interspersed forests in tea, coffee and cardamom gardens and other production landscapes; as well as farmlands, wastelands, wetlands, coastal habitats, heronries, wintering wetlands of birds, turtle nesting sites, pastures for livestock and wild herbivores, and desert ecosystems (MoEF, 2009) (see Chapter 4).

Red Listing exercise

India has many institutions involved in biodiversity research, species assessment and threat status. For instance, Botanical Survey of India (BSI) and Zoological Survey of India (ZSI) are entrusted with the assessment of species in different habitats and ecosystems. Scientific and voluntary organizations have also been independently working on species assessment (e.g. Bombay Natural History Society). Ministry of Environment and Forests recently took steps to involve IUCN and provide the necessary coordinating mechanism between government bodies and voluntary research organizations for collation and analysis of data related to threatened species (MoEF, 2011c).



Photo: Manoj Chandran

Recovery Programme for critically endangered species

The National Wildlife Action Plan (2002-2016) suggests that where *in-situ* conservation efforts are unlikely to succeed, *ex-situ* captive breeding and rehabilitation measures may be necessary, especially with respect to lesser-known species whose status and distribution is not fully known.

In 2011, MoEF in collaboration with ZSI released a comprehensive document – ‘Critically Endangered Animal Species of India’ – that lists 57 species. To improve their conservation status, the government has initiated special recovery programmes for endangered species and their habitat. The species included in this programme are: 1) Snow leopard (high-altitude Himalayas); 2) Bustards and Floricans (grasslands); 3) Dolphin (river systems); 4) Hangul (alpine grasslands); 5) Nilgiri tahr (ridge forests and *shola*-grassland ecosystems in the Western Ghats); 6) Marine turtles and Dugongs (coral reefs and mangroves); 7) Edible-nest swiftlet (Andaman archipelago forests); 8) Asian wild buffalo (grasslands and riverine forests of central and north India); 9) Nicobar megapode (littoral forests of the Nicobar Islands); 10) Manipur brow-antlered deer (floating water bodies and grasslands); 11) Vultures and Malabar civet (low-elevation moist forests in peninsular

India); 12) Great one-horned or Indian rhinoceros (terai grasslands); and, 13) Asiatic lion, Swamp deer and Jerdon’s Courser (MoEF, 2009).

In tandem with the above, in 2012, the Ministry of Science and Technology launched a project to prevent extinction and improve conservation status of 80 prioritized threatened plant species found in different agro-ecological zones of the country. This project, which involves 35 institutions, aims to assess the threat status of these species using population data and initiate conservation actions to improve their status (DBT, 2012).

Translocation of species

A few cases of successful translocation of species carried out in India are listed below:

- In 2005, the Rajasthan government in cooperation with NTCA and WII, initiated re-introduction of tigers to Sariska Tiger Reserve. By 2010, five tigers – two males and three females – were successfully moved from Ranthambhore Tiger Reserve to Sariska Tiger Reserve.
- The India Rhino Vision (IRV) 2020 is a joint programme of the Assam Forest Department, the International Rhino Foundation (IRF) and World Wide Fund for Nature (WWF) with a vision to increase the rhino population in Assam to 3,000 by 2020. Among IRV’s partners are the US Fish and Wildlife Service and Bodoland Territorial Council. When IRV 2020 was initiated, Manas National Park had no rhinos. Since 2008, 10 rhinos have been transferred from Pobitora Wildlife Sanctuary to Manas National Park.⁸
- The Clouded leopard (*Neofelis nebulosa*) is found in the tropical forests of North East India. It is classified as ‘vulnerable’ in IUCN’s Red List of Threatened Species and is listed in Schedule I of the Wildlife (Protection) Act, 1972. Poaching, illegal trade, habitat degradation, and conflicts with humans have been threatening its very existence. In 2009, the Bodoland Territorial Council in collaboration with the International Fund for Animal Welfare and Wildlife Trust of India (WTI) initiated a project to rehabilitate the Clouded leopard. Two pairs of orphaned cubs were successfully hand-raised for the first time in India and introduced into the wild through a well-planned soft-release programme.⁹



Photo: N. K. Vasu

Research and training: human resources for protected areas

Established in 1982, the Wildlife Institute of India (WII) engages in multidisciplinary research and conducts professional training for protected area managers and enforcement agencies, as well as running a masters' programme in wildlife biology and management. Its research programme is focused on a countrywide prioritized framework of landscapes. Typically, the landscapes involve multiple disciplines and allow research on different spatial scales and themes. The Institute has developed a special training package for frontline staff and has helped in enhancing the capacity of trainers in state forest schools.

Apart from WII, there are other institutions involved in research on protected areas. These include Salim Ali Centre for Ornithology and Natural History, Centre for Ecological Sciences at the Indian Institute of Science, Bombay Natural History Society, World Wide Fund for Nature (WWF), Ashoka Trust for Research in Ecology and the Environment, Nature Conservation Foundation, Wildlife Protection Society of India, Wildlife Trust of India, Samrakshan Trust and Centre for Wildlife Studies. Government and non-government agencies also collaborate frequently, as in the case of the 2010 National Tiger Assessment where NTCA and WII collaborated with NGOs like Wildlife Trust of India, Aaranyak and WWF-India.



Photo: Lingaraj

Ex-situ conservation: complementing protected area governance

To complement *in-situ* conservation, India has developed programmes for *ex-situ* conservation by setting up botanical gardens, zoos, deer parks and safari parks. The national scheme on Botanic Gardens provides financial assistance for *ex-situ* conservation of threatened and endangered species.



Photo: Alankar K. Jha

Department of Biotechnology (DBT) has also established a national 'Laboratory for Conservation of Species' – LaCONES at Hyderabad jointly with Centre for Cellular and Molecular Biology, CZA, Council for Scientific and Industrial Research (CSIR) and the Andhra Pradesh government for conservation of endangered animal species like tiger, lion, blackbuck, and vulture.¹⁰ The Central Zoo Authority has identified 73 critically endangered wild fauna for coordinated conservation breeding in Indian zoos. Three objectives, i.e. proper captive stock for continuous display in Indian zoos, properly bred animals to act as insurance against the collapse of their wild populations, and for reintroduction or release in the wild, are the basis of conservation breeding and recovery programme for endangered species in India (Sharma, 2012) (see Box 3.7).

BOX 3.7: Ex-situ and in-situ linkage: conservation of Red panda

The Red panda (*Ailurus fulgens*) inhabits the mixed deciduous and coniferous forests of Himalayas at altitudes between 2,200 and 4,800 metres. IUCN estimates that fewer than 2,500 individuals of this species survive in the world. In India, Red panda is found in Singalila and Neora Valley National Parks in West Bengal, in Singhik, Chunthang, Menshithang,

Photo: Alankar K. Jha



Lachen, Yaksum and Lachung areas of Sikkim, and in Mehao Wildlife Sanctuary, Arunachal Pradesh. The Padmaja Naidu Himalayan Zoological Park in Darjeeling, West Bengal is the only zoo that has a stock of Red pandas drawn from the animal's natural range. A planned Red panda breeding programme was initiated in the early 90s as part of the Global Red Panda Management Programme. As part of this programme, the zoo received five Red pandas from various foreign zoos to augment its existing collection of four wild Red pandas. In 2003, two females were selected from a population of 22 Red pandas in Indian zoos for release in their native habitat at Singalila National Park. While both were reintroduced in the wild, one was predated upon, while the other mated with a wild male and reproduced.

Source: Jha, 2012.

Identification of transboundary protected areas

As per the IUCN definition, 'an area of land and/or sea that straddles one or more boundaries between countries beyond the limits of national sovereignty or jurisdiction, whose constituent parts are especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and is managed co-operatively through legal or other effective means could be designated as a transboundary protected area (TBPA)'. In 2005, a Task Force set up by MoEF prioritized (using six criteria and 24 indicators) five out of 24 protected areas located along the Indian border as potential TBPAs in the Indian sub-region (see Table 3.1).



Photo: Manoj Chandran

TABLE 3.1: Proposed transboundary protected areas in the Indian sub-region

Region	Protected areas in India	Protected areas in border country
India-Bangladesh	Sunderban NP, 1330 km ²	Sunderban WLS, 1400 km ²
India-Bhutan	Manas NP, 500 km ²	Royal Manas NP, 1000 km ²
	Buxa Reserve, 757.90 km ²	Phibsoo WLS, 268.93 km ²
India-Nepal	Dudhwa NP, 490 km ²	Shuklaphanta WLS, 305 km ²
	Valmiki NP & WLS, 880 km ²	Royal Chitwan NP, 932 km ²

Source: Report of the Task Force on transboundary protected areas, MoEF (unpublished).

Challenges for protected area governance

A large number of India's designated protected areas exist as small and fragmented entities. At several places, issues of access to and use of biological resources lead to conflict between protected areas and local communities. Human-animal conflict and wildlife crime continue to cause concern (MoEF, 2009), while climate change poses a new threat. The main barriers to effective protected area governance can be broadly clustered under three headings: (i) land-use issues; (ii) human issues; and (iii) institutional issues. These are detailed below:

Land-use issues

Small and fragmented protected areas and habitat degradation: India's protected area network still does not cover its full range of biological diversity. Expansion of the protected area network is a formidable task in the face of competing land-use claims and limited land per capita. Further, intense biotic pressure is causing habitat degradation in many protected areas.

Limited protection of wildlife outside protected areas: A large expanse of crucial wildlife habitats and vast range of species exist outside the formal protected area system. These range from government-controlled reserved forests to vegetation interspersed in plantations, CCAs etc. Absence of focused conservation measures in

these habitats leads to poaching, human-animal conflict, habitat degradation and species loss.

Unscientific and non-compatible land use-practices: Activities like agriculture, plantation, mining, industry, irrigation, communication, road infrastructure and urbanization in the vicinity of protected areas are threatening habitats and species. Many protected areas also experience mass influx of visitors either promoted by wildlife tourism or pilgrim tourism. Unregulated tourism leads to habitat disturbance and pollution.

Invasive alien species: Species like *Lantana camara*, *Salvinia*, *Eichhornia* and *Prosopis juliflora* pose a serious threat to native species and considerably reduce the conservation value of protected areas. Lack of systematic assessment and monitoring of invasive species, absence of effective eradication techniques and limited funds for their removal are some of the other challenges protected areas face.

Human issues

Limited livelihood opportunities and high dependence for subsistence: Several protected areas have significant human population living within them or on their fringes. As the reach and penetration of rural development programmes are relatively low in such areas, there is high dependence on protected areas for sustenance and livelihood, which often exceeds the sustainability threshold.

Political unrest: A number of protected areas are located in regions rife with political unrest, resulting in decreased ability of state governments to effectively manage them.

Human-animal conflict on the rise: Habitat disturbance in core areas, increased human activity in buffer areas and disturbance of wildlife corridors lead to rising human-animal conflict, creating hardship for people and provoking retaliatory killing of wild animals.

Institutional issues

Absence of comprehensive landscape conservation policy: Given the relentless expansion of production



Photo: M. Balan

activities into the hinterlands and a multiplicity of departments having mandates over different resources, there is a need to mainstream biodiversity into the policies governing the use of land and resources across the landscape. At present, individual sectors pursue their own development objectives, often contradicting other's mandates or even negating conservation priorities.

Need for scientific planning for multiple-use management regimes: Given the multiple objectives of managing the core and buffer zones of protected areas and ESZs beyond, there is a need for spatial planning, based on scientific assessment of the ecological impact of interventions. At present, the knowledge base on adaptive management of multiple-use landscapes is rudimentary. The economic contribution of protected areas, in terms of providing ecosystem goods and services, is yet to be assessed in a comprehensive manner.

Weak focus on marine protected areas: The current template of protected area governance provided in the Wildlife (Protection) Act is designed primarily for the creation and management of terrestrial protected areas. This template does not automatically apply to marine protected areas where livelihood aspirations and conservation objectives overlap significantly.

Inadequate financial resources: There is always a gap between funds required and made available to protected areas. There has been no systematic assessment of the finances required for effective protected area governance in the country. Further, unleashing the economic potential of protected areas is a major challenge, except a few cases (e.g. ecotourism-based resource generation in some protected areas).

Inadequate involvement of local communities: As yet, there has been no assessment of the extent of livelihood dependence of local communities on protected areas and their contribution to conservation. In many places, settlement of rights of people in protected areas is not carried out in a time-bound manner. Fear of displacement, loss of access to resources, increasing human-wildlife conflict and inadequate livelihood opportunities outside protected areas result in low involvement of communities in conservation.

Way forward

An effective protected area governance paradigm is crucial for securing India's ecological security. Despite impressive gains over the years, the protected area system needs to adapt to changing times. Some of the main focus areas for the future are:

- **Achieving 10 percent protected area coverage:** The National Wildlife Action Plan (2002-2016) aims to bring 10 percent of the geographical area of the country under the protected area network. Recommendations are in place to establish 67 new National Parks and 203 new Wildlife Sanctuaries to make the network geographically representative. Further, as a benchmark against global standards, it would be worthwhile if India could apply the IUCN categorization of protected areas over India's natural resources.
- **Expansion of Conservation Reserves and Community Reserves:** While these two new categories of protected areas were introduced in 2002, the number of Community and Conservation Reserves has not increased much. More resolute efforts are needed to promote them.
- **Protection of wildlife outside protected areas:** A significant population of wildlife outside the protected area network is under grave threat due to the absence of biodiversity mainstreaming policies governing these areas. Since 2008, MoEF is implementing a programme on Integrated Development of Wildlife Habitats for strengthening wildlife conservation outside the legally designated protected areas. This programme needs more outreach.
- **Expansion of marine protected areas:** India needs to considerably strengthen its marine protected area network. This requires amendments to the Wildlife (Protection) Act to create spaces for the specific requirements of marine protected areas. Further, this requires harmonization of various sectoral policies and legislation.
- **Integrating protected areas into wider landscapes:** There is a perceptible shift in protected area governance from the earlier 'people-exclusive'

approach to the new landscape-based approach which involves engaging a range of stakeholders. However, more efforts are required for mainstreaming protected area management into development planning – at national, sub-national and local level.

- **Articulating an economic case for protected areas:** Securing adequate financial resources for protected area management remains a challenge. The economic contribution of protected areas in terms of provisioning ecosystem goods and services and supporting livelihoods (e.g. grazing, NTFPs etc.) needs to be assessed and articulated strongly in policy circles.
- **Securing livelihoods of local communities and generation of sustainable livelihoods:** Identification, planning and implementation of successful and scalable ecodevelopment activities that support livelihoods while weaning communities from negative dependence on biological resources is a priority.

- **Adapting to climate change:** Climate change is projected to have significant impact on protected areas. While its exact nature is yet to be assessed, pioneering studies show that endemic mammals like Nilgiri tahr face an increased risk of extinction (Sukumar *et al.*, 1995). Due to sub-optimal technical capacity and resources, building resilience to climate change and climate proofing of protected areas has not made much progress in the country. Such efforts need to be initiated and strengthened.
- **Identification of inviolate areas for wildlife conservation:** Given the high dependence on protected areas and the highly involved procedure for voluntary relocation of communities living therein, the identification and demarcation of inviolate areas pose a major challenge for protected area managers. This requires priority attention.
- **Formal recognition of CCAs:** While a beginning has been made in identifying and mapping CCAs across the country, concerted efforts are required to formally recognize and support them.

Endnotes

- ¹ Several of these protected areas are also designated as World Heritage Sites by UNESCO (e.g. Kaziranga National Park, Manas National Park, Nanda Devi National Park, Sundarbans National Park, Keoladeo National Park and a cluster of protected areas in the Western Ghats).
- ² Centrally sponsored schemes are programmes that are funded directly by central Ministries or Departments, and are implemented by state governments or their agencies.
- ³ India, Ministry of Law and Justice (2006). The Wildlife Protection (Amendment) Act, 2006, Act No. 39 of 2006.
- ⁴ Available from <http://projecttiger.nic.in/>. Accessed 28 August 2012.
- ⁵ India, Ministry of Environment and Forests (2011). *Gajah- Securing the Future for the Elephant in India*. New Delhi
- ⁶ Statutory requirements are (1) legal delineation and notification of core and buffer areas; (2) establishment of Tiger Conservation Foundation; (3) development of a tiger conservation plan; and (4) constitution of a state-level Steering Committee under the chairmanship of the Chief Minister.
- ⁷ From various publications of Planning Commission, Government of India.
- ⁸ WWF-India. 'Translocation of wild Rhinos carried out in Assam, India' (Available from <http://www.wwfindia.org/?5180/Translocation-of-wild-Rhinos-carried-out-in-Assam-India>. Accessed 13 August 2012).
- ⁹ Wildlife Trust of India. 'Tribute to the environment: Rehabilitated clouded leopards draw better protection to release landscape' (Available from http://www.wti.org.in/current-news/120604_Tribute_to_the_environment_Rehabilitated_clouded_leopards_draw_better_protection_to_release_landscape.htm. Accessed 13 August 2012).
- ¹⁰ Centre for Cellular and Molecular Biology (n.d.). Laboratory for the Conservation of Endangered Species (Available from <http://www.ccmb.res.in/vr/ccmb-vr-qt/lacones-vr/index.html>. Accessed 4 September 2012).

Autonomous Conservation Efforts – 4 Community Conserved Areas

Long before the advent of modern-day conservation approaches, rural communities in India have been conserving forests, mountains, rivers, wetlands, trees, birds and animals in various inventive ways. The vast array of India's biological diversity has benefited immensely from their untiring efforts. Threats from unplanned development, competing land-use claims, eroding traditional values, and disintegrating knowledge systems are some of the challenges that communities face today. Strengthening community institutions and supporting them appropriately would go a long way in making their conservation efforts sustainable.

Introduction

It is now widely acknowledged that a significant part of biological heritage exists in areas under the ownership, control or management of local or indigenous communities. It is estimated that protected areas and community conserved areas (CCAs) together account for around a quarter of the land area of the world (Ervin *et al.*, 2010).

The IUCN World Parks Congress (2003) defined CCAs as 'natural and/or modified ecosystems containing significant biodiversity values and ecological services, voluntarily conserved by (sedentary and mobile) indigenous and local communities, through customary laws or other effective means'. The Congress urged the world community to strengthen, protect and support CCAs by framing and promoting laws that recognized the effectiveness of innovative governance models of indigenous and local communities. The Congress also encouraged the United Nations Environment Programme-World Conservation Monitoring Centre (UNEP-WCMC) to expand its data collection and dissemination programme to include all governance types, particularly

areas of conservation value established and managed outside the formal protected area network. Following this, UNEP-WCMC initiated a Directory of global CCAs, working with UNDP. The seventh meeting of the Conference of the Parties to the CBD also highlighted the need for formulating guidelines on CCAs.

In India, CCAs comprise a wide spectrum of landscapes and seascapes (Box 4.1). They are often found amidst human-modified surroundings and act as corridors of biological diversity between formal protected areas and other high-value biodiversity areas in production landscapes. They ensure connectivity in the landscape, provide valuable ecosystem goods and services (Kothari *et al.*, 2000), and are an important component for adaptation to climate change.¹ A major challenge in supporting and scaling up CCAs in India has been their relative invisibility to policymakers, scattered presence, and lack of a comprehensive inventory of their practices. Consequently, there is no specific policy or legal framework on CCAs.

The following section gives an overview of India's experience in community stewardship for natural resource management, particularly through CCAs.

Photo: Foundation for Ecological Security



BOX 4.1: What are community conserved areas?

Community conserved areas are 'Natural ecosystems (forests/marine/wetlands/grasslands/other), including those with minimum to substantial human influence, containing significant wildlife and biodiversity value, being conserved by communities for cultural, religious, livelihood or political purposes, using customary laws or other effective means where community means a group of people geographically, culturally and traditionally linked, sharing an interest in and/or interacting with a common natural resource base (ecosystems and species)' (MoEF, 2009).

The term, 'community' does not necessarily indicate a homogeneous entity. Community conserved areas differ in governance institutions, management objectives, ecological and cultural attributes. Some of the common characteristics of CCAs include: 1) predominant or exclusive control and management by communities, and 2) commitment to conservation of biodiversity, and/ or its achievement through various means.

Diversity of CCAs in India

Community conserved areas exist all over India in diverse habitats and ecosystems (Figure 4.1). They encompass forests, wetlands, lakes, rivers, grasslands, deserts, tropical swamps, estuaries, bamboo and reed breaks, coastal stretches, marine areas, mangroves, coral reefs, sacred groves, community forests, interspersed forests in tea plantations, coffee and cardamom gardens, heronries, wintering wetlands of birds, catchment forests, turtle nesting sites, and pastures for livestock and wild herbivores (MoEF, 2009). Sacred groves (SGs)



Photo: Basant K. Sharma

FIGURE 4.1: Community conserved areas across forest types

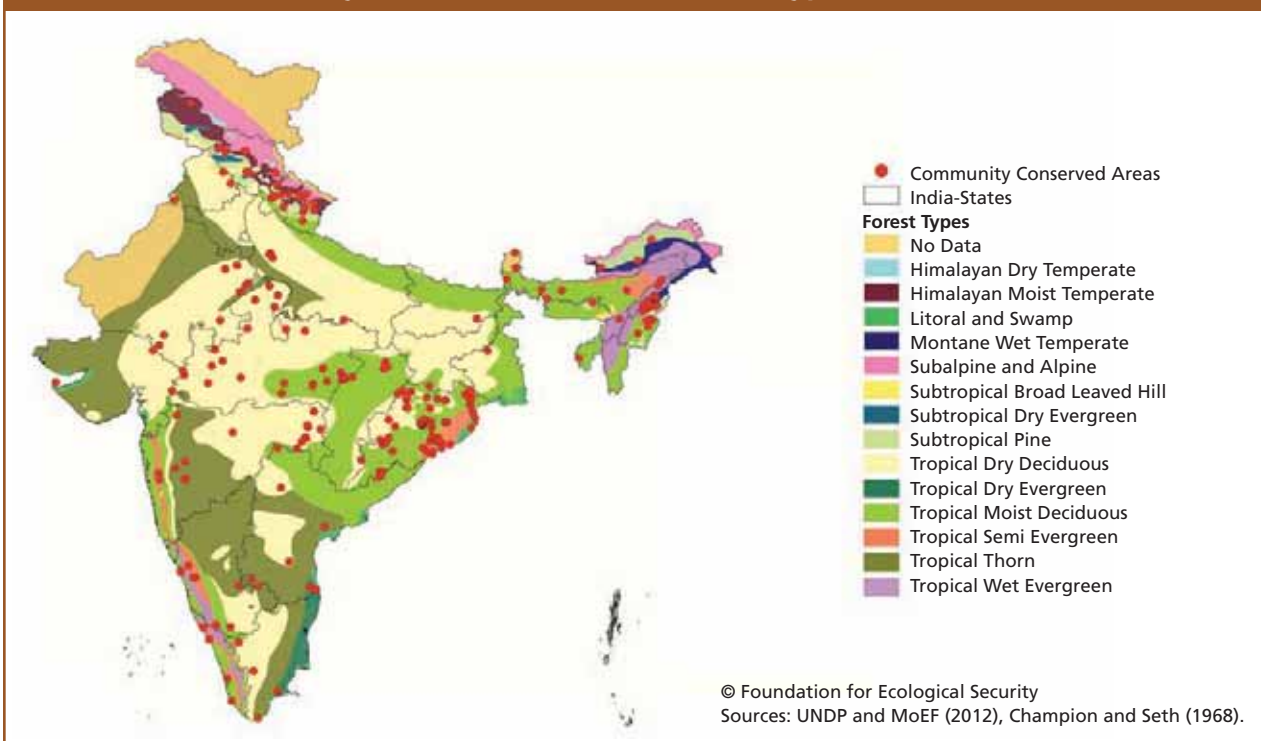


TABLE 4.1: Ecosystems covered by CCAs in India

Ecosystem	Region
Forests	<ul style="list-style-type: none"> ● Protected for sacred reasons, e.g. sacred groves (SGs) found throughout India ● Protected and managed for sustainable use, e.g. community forestry in Odisha ● Maintained for wildlife conservation, e.g. community protected areas of Nagaland
Grasslands	<ul style="list-style-type: none"> ● <i>Orans</i> (groves and grasslands) of Rajasthan ● <i>Banni</i> grasslands of Kutch ● Managed grasslands (<i>Bugyals</i>) of Uttarakhand ● Fodder plots of Gujarat and Rajasthan
Wetlands	<ul style="list-style-type: none"> ● Traditional village tanks/ponds supporting high diversity of flora and fauna, e.g. in Tamil Nadu ● River flood plains of Assam ● Lakes, e.g. Chilika lake in Odisha ● Lagoons of Lakshadweep Islands
Coasts/ marine	<ul style="list-style-type: none"> ● Coastal backwaters managed for sustainable harvesting of marine species, e.g. Ashtamudi in Kerala

Based on MoEF, 2009.

are a specific category of CCAs constituting a significant proportion. An indicative list of ecosystems covered by CCAs in India is given in Table 4.1.

Community conserved areas are also characterized by diversity in their practices. Some examples of these are: 1) protection of 1,800 hectares of forests by Mendha (Lekha) village in Maharashtra by the Gond tribal community; 2) conservation and sustainable use of more than 5,000 hectares of forest land for collection of NTFPs by 95 villages in Budhikhamari area of Mayurbhanj district in Odisha; 3) protection of Vembanad lake in Kerala for sustainable fishing by a Federation of Lake Protection Forums; 4) protection of sea turtle eggs, hatchlings, and nesting sites by a fishing community in Kolavipalam, Kerala; 5) conservation of Painted stork and Spot-billed pelican nesting sites by the people of Kokkare Bellur village, Karnataka; 6) participatory monitoring and sustainable use of NTFPs by the Soliga tribal community at the Biligiri Rangaswamy Temple sanctuary, Karnataka; 7) community forestry initiatives in several thousand villages of Odisha; 8) protection of heronries in Hejjarle Balaga in Karnataka; 9) protection of Blackbuck in Karopani Conservation Area, Madhya Pradesh; and 10) conservation of marine turtles in Rushikulya, Odisha.



Photo: Foundation for Ecological Security

Origin, objectives and ownership of CCAs

The origin of most of the CCAs in India is intertwined with local history. Community conserved areas have been categorized on the basis of their origin (self-initiated, externally initiated), practices (unchanged traditional, revived traditional, new), objectives (self-empowerment, political, social), livelihood function, ecological function, religious sentiment, cultural association, biodiversity conservation (species/habitat) and response to external threat (Pathak, 2009). The self-initiated CCAs are the continuation of traditional practices or efforts by a few individuals or the entire community (see for example Box 4.2). External drivers for establishing CCAs could be community-based organizations or the State.

Most CCAs are managed for multiple objectives. Some of these are: 1) resource enhancement and/or maintenance; 2) countering ecological threat; 3) combating external threat; 4) expressing religious sentiments, cultural concerns and/or continuing traditional systems; 5) political expression; and 6) managing biodiversity concerns. The Indian experience shows that the most common reasons for establishing/maintaining CCAs have been resource enhancement and biodiversity conservation (Pathak, 2009).

Community conserved areas exist on lands owned by communities, government, individuals or even disputed lands. A CCA may extend over various land ownership categories, include diverse land tenure systems and yet be managed as a single unit. However, the majority of CCAs seem to exist on lands owned by the government (MoEF, 2009).

BOX 4.2: Traditional conservation practices by tribal communities in North East India

- In East Kameng district of Arunachal Pradesh, the Nishi tribe has established elaborate controls over critical watersheds and forests. These include protection of hilltop forests; forests around lakes and mountains (*sineiak*); forests in the vicinity of villages (*myoro tom*); and forests in niche habitats and along drainage channels (*changtam bote*). In addition to forest protection, a variety of plants and animals are considered sacred and not harmed.
- The Jamatia people of Killa Block of South Tripura district follow a traditional forest management system known as *daikong bolong*. During the India-Pakistan war of 1970-71, influx of thousands of refugees to Tripura caused heavy pressure on forests for timber and NTFPs. At that time, the Jamatia community decided to revive *daikong bolong* and renamed it as *Asha Van* (forests of hope).

Source: Poffenberger *et al.*, 2007.

There is limited documentation available about the processes involved in the setting up and functioning of CCAs. For instance, why did a community decide in the first place to conserve? What was the need and motivation? Who played a key role or acted as a trigger for change? How did the community accept this change and what was the level of their participation? More importantly, how have they benefitted from the CCA, particularly if it involved locking up of resources for conservation? How have they settled internal conflicts? Detailed case studies can answer these questions, but only a small proportion of CCAs in India have been documented.



Photo: Ashis Gharai

Scale and extent of CCAs

Community conserved areas have a pan-Indian presence and distribution. Even though the practice of community-based conservation is widespread, it is difficult to ascertain (in the absence of a national CCA register) exactly how many of them exist. A Directory of community conserved areas published by Kalpavriksh has given a detailed account of 137 CCAs from various parts of the country (Pathak, 2009). A recent UNDP study lists more than 5,000 cases of community-based conservation initiatives in Odisha and another 200 in Madhya Pradesh alone (UNDP and MoEF, 2012).² An estimate of the number of SGs in India ranges from 100,000 to 150,000 (Malhotra, 1998).

The area covered by CCAs is highly variable. It is reported that more than 60 percent of CCAs cover, on average, more than 100 hectares (Pathak, 2009). In Odisha alone, the extent of CCAs ranges from 18 hectares to more than 300 hectares. There are also cases where a number of villages jointly protect more than 10,000 hectares of forests (UNDP and MoEF, 2012). Among the largest known CCAs, *Thembang Bapu* CCA in Arunachal Pradesh notified by the village Panchayat, stretches over 312 km².

Similarly, there is no comprehensive documentation on the number of SGs and the area covered by them. One report shows the presence of 9,000 SGs covering 68,000 hectares (Malhotra *et al.*, 2007). According to

Forest Department records, Kodagu, a single district of Karnataka, has about 1,214 *devarakadus* (SGs), spread over an area of about 2549 hectares (Kalam, 1996, cited in Malhotra *et al.*, 2007). Compared to CCAs that cover a relatively larger area, most SGs are small. For example, *Shravan-Kavadia*, an isolated temple grove in the *Banni* region of the Great Rann of Kutch, is a community-protected mangrove patch of about 200 *Avicennia marina* trees in an otherwise desert landscape.

In contrast to the general perception that CCAs exist in isolation, they are mostly found in clusters as, for instance, in Odisha. The clustering of CCAs could be attributed to motivation or necessity. For example, once a village starts protecting its own resources, it starts depending on the resources of neighbouring villages for an initial period. The latter then, starts protecting its own resources to prevent over-use. In other words, the benefits of a CCA, or its leadership, inspire other villages to follow suit. Another reason for clustering could also be that when government or an NGO initiates a programme-based intervention in more than one village in a neighbourhood, other villages follow (MoEF, 2009).

Most CCAs appear to follow a landscape approach where the land use involves 'high human use', 'low human use' or 'no use' patterns. If CCAs are considered as part of protected areas (as per IUCN categorization), more than 10 percent of India's geographic area will come under the protected area network as against the reported coverage of around 4.9 percent (Pathak, 2009).



Photo: Manoj Chandran

Legal and policy framework

While there is no specific policy or legal framework for recognizing or supporting CCAs, there are a number of laws and policies that have a bearing on them. Some of these are listed in Table 4.2.

To some extent, the existing policy and legal framework in the country provides for communities to engage in natural resource management. However, most of the rules and procedures subsequently laid down for formation of governance institutions, monitoring and supervision etc. are vested with government agencies. Given the varied socio-cultural and ecological contexts in the country,

there is a need to retain the flexibility of grassroots-level institutional structures (both formal and informal) and mechanisms for decentralized decision-making.

India's strong NGO networks and community-based organizations have made continuous efforts to recognize and support CCAs. Based partly on a realization of the critical importance of community efforts in conservation, since 2008, MoEF has been providing financial and technical support to community-based conservation through the Integrated Development of Wildlife Habitats programme. In addition, MoEF constituted an expert panel in 2009 to look into the management and funding of CCAs, Community Reserves and Conservation Reserves.

TABLE 4.2: Important laws and policies relevant for CCAs in India

Policy/ Law	Institutional forms of CCAs
Biological Diversity Act, 2002	<ul style="list-style-type: none"> ● Provision to declare areas conserved for agricultural or wildlife biodiversity as Biodiversity Heritage Sites. ● Provision to form Biodiversity Management Committees (BMCs) at the village level for the management, protection and documentation of local biodiversity. ● National and State Biodiversity Boards to consult BMCs on resource management
Indian Forest Act, 1927	Provision for formation of village forests.
Panchayats (Extension to the Scheduled Areas) Act, 1996	In the Schedule V areas (tribal areas listed in the Indian Constitution) Gram Sabha (village assembly) is permitted to exercise ownership over minor forest produce.
Scheduled Tribes and Other Traditional Forest-Dwellers (Recognition of Forest Rights) Act, 2006	Under the category of community forest rights, communities can create local institutions, rules and regulations for protection of forests that they have been traditionally conserving.
Environmental (Protection) Act, 1986	Provision for declaration of ecologically sensitive areas and regulation of developmental activities in them.
Wildlife (Protection) Act, 1972	Provisions for establishment of community-oriented protected areas, either on government land (Conservation Reserve) or on land owned by individuals or communities (Community Reserve).
National Forest Policy, 1988	Recognition of people's need to access forests and resources for their livelihoods and mandatory involvement of local people in the management of forests.

Institutional diversity

The institutions governing CCAs are as diverse as the biodiversity that they support. The structure and form of these institutions depend upon the socio-cultural and ecological context of the area and in several cases, the support provided by external agencies. These institutions could be either formal or informal (depending on whether these are registered under specific legislation or not). There could also be multiple institutions within village(s) for managing different aspects of CCAs.

Ownership and commitment are two key factors responsible for the emergence and existence of CCAs. There are cases where weakening of traditional institutions along with external threats led to the degeneration of CCAs. For example, the mangrove swamps of the Gulf of Kutch used to harbour the Mugger crocodile

(*Crocodylus palustris*) and a temple was constructed to worship it as *Khodyar Mata* (Goddess). While the temple still exists, the crocodile is now almost extinct from the area due to large scale poaching. Conversely, in several cases, communities are known to initiate conservation actions prompted by perceived worsening of degradation or sudden decline in population of a particular species that used to be in abundance in their vicinity. These efforts have sometimes been supported later by external agencies (NGOs or government).

In some areas, especially in Rajasthan, West Bengal, Chhattisgarh and Jharkhand, new SGs are being established. In Karnataka for instance, the concept of CCAs has been extended to establish new *pavitra vana* (sacred forests). New SGs have also been established around temples and schools. In Kerala, for better protection of SGs, partnerships have been established among SG trustees, NGOs and local people (Malhotra

FIGURE 4.2: Typology of institutional forms of CCAs in India

Composed of the entire village or group of villages

The village or group of villages decides on the initiatives, rules and regulations etc. The village assembly meets regularly. In some cases, where the conserved area includes land under the control of the Forest Department, the decisions on the forest land are decided by forest protection committees formed under JFM.

Composed of representative body(ies) of the village(s)

In some cases the entire community may decide to select or elect a committee or a smaller body to take decisions. In other cases, the committee may only be allowed to implement the decisions taken by the larger council.

Set up by external agencies

The community has a representative body that has been constituted by an NGO, government or any other agency for managing the conservation programme initiated by them.

Sub-unit of larger village community but functioning independently

These groups, some of them registered trusts or societies, work independently of the decision-making process in the village and follow local rules, regulations and interests.

Based on Pathak, 2009.

et al., 2007). Institutional forms of CCAs in India are summarized in Figure 4.2.

Management of CCAs can follow traditional practices of conservation, modified practices or adopt completely new practices. A synthesis of more than 100 case studies across India suggests that in almost two-thirds of the cases, new conservation practices have been devised after the decision to conserve was taken. This points to the fact that new community-conservation initiatives are continuously emerging (Pathak, 2009). It is also observed that CCAs evolve over a period of time. Some of the institutional forms into which CCAs have evolved over a period of time are shown in Table 4.3.

Interestingly, at the village level, SG governance often mirrors the socio-cultural or religious traditions, customs and/or habits of the local communities. It may depend on the social organization or unique characteristics of its protectors. For example, at village level, certain inhabitants of the village or even different ethnic groups may have their own groves. In some cases, the SG may be managed by the entire village community comprised of multiple ethnic groups. At regional level, certain SGs are frequented by people from several neighbouring districts or even different states. At the highest level, there are SGs that are visited by people from many parts of the country. Both regional and pan-Indian groves tend to be large and are often managed by temple trusts (Malhotra, et al., 2007).



Photo: Foundation for Ecological Security

TABLE 4.3: Institutional forms and examples of CCAs

Institutional form	Name of the institution	Location	About the institution and its work
Community-based organizations	Khedut Mazdoor Chetna Sangath	Alirajpur, Madhya Pradesh	The organization is a union of Bhil and Bhilala tribal communities in Alirajpur district of Madhya Pradesh. The community has been voluntarily conserving forests, soil and water resources for the past two decades.
	Umbalacherry Cattle Herders' Association	Nagapattinam, Tamil Nadu	Umbalacherry Cattle Herders' Association is a registered society with 480 members from 11 villages of two districts of Tamil Nadu in southern India. The primary contribution of the institution is <i>in-situ</i> conservation of the Umbalacherry cattle breed, renovation of ponds and common grazing lands, and training livestock keepers on herbal medicine for animals.

Institutional form	Name of the institution	Location	About the institution and its work
Federation of community-based organizations	Samyukta Vembanad Kayal Samrakshana Samithy	Alappuzha, Kerala	The Samyuktha Vembanad Kayal Samrakshana Samithy is an apex body of the Lake Protection Forums (LPF) of local communities who protect and conserve the Vembanad lake ecosystem. There are 13 LPFs around Vembanad lake comprising fishers, clam collectors, and other community members. Due to increasing anthropogenic activities and physical alterations carried out in the lake, fishery resources have been severely affected. In order to address this situation, the LPFs are actively engaged in activities to sustain and improve lake resources. The main activities undertaken are the establishment of Community Fish Sanctuary and adopting responsible fishing practices in two districts- Kottayam and Alappuzha.
Cooperatives	Kalpavalli Tree Growers- Mutually Aided Cooperative Society	Anantapur, Andhra Pradesh	The Kalpavalli Cooperative Society protects an area of 3,400 hectares of common land in eight villages of Anantapur district of Andhra Pradesh. Each village has a Vana Samrakshana Committee (Forest Protection Committee) which is federated into Kalpavalli Tree Growers- Mutually Aided Cooperative Society.
Informal village committees	Forest Protection Committee, Lasyal Gaon	Tehri-Garhwal, Uttarakhand	Lasyal Gaon Forest Protection Committee was formed in 1981 in response to the emerging challenges of forest degradation, increasing hardship for forest-dependent communities and inter-community conflicts in the region over land and forest resources.
Women's groups, youth groups	Pir Jahania Jungle Surakhya Committee	Puri, Odisha	The women of the village of Gundalba formed the Pir Jahania Jungle Surakhya Women's Committee in 2000. The village is located at the mouth of the Devi river, one of the mass nesting sites of the Olive Ridley turtle. They have been successfully protecting around 15 km ² of casuarina forests and 5 km ² of mangrove forests. The villagers not only protect the turtles during the breeding season, but also have special norms for fishing during their mating and nesting seasons.
Sacred grove management committee	Mawphlang Welfare Society	East Khasi Hills, Meghalaya	The ecosystem includes four SGs (Mawphlang, Lyngkien, Pom sam rgtut and Sohra rim) covering 150 hectares, river Umiang Mawphlang sub-watershed consisting of 62 villages, and community forest areas in the East Khasi Hills district of Meghalaya. The people involved in the management are tribal youth and women.

Source: Nominations received for the GoI-UNDP India Biodiversity Awards, 2012.

Conservation process

The institutions governing CCAs frame rules and regulations for the conservation and management of natural resources. These rules and regulations are highly specific to the context in which they exist and thus vary across CCAs as well as different geographical and cultural landscapes. CCA management norms can be written or verbal; and brief or detailed. Some of the customary rules/ practices relating to CCA governance include the following:

- Constitution, structure and functioning of the CCA governance institution.
- Membership of the institution and benefits accruing to members.
- Protection and monitoring of the resources of the CCA.
- Harvesting of resources – deciding on what is allowed to be harvested and by whom, quantum of harvest, seasons for harvest, and procedures for harvest.
- Defining the area for extraction.



Photo: Foundation for Ecological Security

Most CCAs have instituted a system of penalties for violations. These penalties could be monetary or non-monetary – such as social sanctions, confiscation of equipment or fines in kind. These are largely based on customary practices that may or may not invoke government law. Interestingly, in some CCAs, especially in many SGs, the community believes that the violator/offender will be punished by divine power. The strength of the belief itself ensures that rules are adhered to. Sophisticated institutional mechanisms (traditional or new) exist in several CCAs to resolve intra-village, inter-village and inter-community conflicts. In cases where such institutions do not exist, the villagers depend on government agencies, in particular the Forest Department (Pathak, 2009).

Some of the highly proactive conservation measures adopted by SGs are noteworthy. For example, in Iringol kavu in Kerala, the villagers practice a self-imposed ban on the removal of biomass from the SG. The temple trust organizes awareness programmes and involves stakeholders in conservation (Chandrashekara and Sankar, 1998). Similarly, the Dambuk Atong Community Conservation Reserve in Meghalaya has developed a detailed land-use plan (see Box 4.3).

BOX 4.3: Dambuk Atong Community Conservation Reserve, South Garo Hills District, Meghalaya

The Dambuk Atong Community Conservation Reserve management committee has drawn up a detailed land-use plan for the Aking's (clan village) forests. The plan delineates areas for timber collection for household use, shifting cultivation, orchards and habitation.

The land-use plan also marks areas under threat from illegal logging and debarking of trees by neighbouring villagers. With the help of an NGO, Samrakshan Trust, the management committee has compiled a detailed list of forest products in demand and is in the process of developing a management plan to ensure that the forest resource needs are met sustainably.

Source: Nomination received for the Gol-UNDP India Biodiversity Awards.

Conservation outcomes

In many cases, CCAs are as effective in their conservation practices as those of formal institutions set up by the government. There are several documented examples where conservation efforts by communities have been ecologically effective (see Box 4.4). Many SGs are climax ecosystems, and they constitute the only representative of near-natural vegetation in many parts of India. They harbour medicinal plants used in local and alternate systems of medicine.³ SGs also serve to preserve genotypes that may be useful in forest tree-breeding programmes (Malhotra *et al.*, 2007).

While communities involved in CCA management may benefit from conservation efforts, they also bear the cost of conservation. Some of the costs that the community incurs may include: 1) cost of time and effort in protection, management and planning; 2) expenditure on wages or investment in corpus fund; 3) temporary loss of access to natural resources; 4) donation of private land for conservation; 5) cost of conflict with neighbours or migrating communities, including threat to life and property; 6) increased crop depredation due to increase in wildlife population; and 7) loss of livelihood opportunities. In most cases, the costs are understood and internalized by the community. However, at times, these costs

BOX 4.4: Conservation outcomes from Sendenyu community protected area

Unbridled hunting and encroachment in Sendenyu village forest of Nagaland had led to the disappearance of several species of wild fauna. Realizing this, the Sendenyu village community banned hunting and started regenerating their forests. This has had remarkable results. Many species have reappeared and a variety of animals such as wild boar, Barking deer, Sambar deer, Hog badger, wild dog, bear, leopard, macaque, Flying fox, Flying squirrel, civet, Slow loris and otter now frequent the area. Birds like barbet, woodpecker, partridge, quail, pheasant, dove, pigeon, owl, cuckoo, bulbul, flycatcher and bush-robin are quite common. In 2009, a new amphibian species was discovered in the CCA. The species is named after the village as *Ichthyophis sendenyu*. At present, the community is cataloguing local names for birds, animals, trees and medicinal plants in the CCA.

Source: Nomination received for the Gol-UNDP India Biodiversity Awards, 2012.

become substantial and may have a negative impact on the conservation effort. In such circumstances, external support from NGOs or government for the community's effort towards conservation would be prudent (Pathak, 2009).



Photo: M. Balan

Challenges

Community conserved areas face multiple challenges; both internal and external (see Box 4.5). Internal challenges include inequity within the community, and unequal participation in decision-making in situations where elite members of the community hold authority. These challenges are acute in societies where communities are heterogeneous and one group (based on caste, class or religion) dominates in number or in power.

In some CCAs, women are excluded from decision-making (though in others they participate on equal terms or may run the organization themselves). Such inequities threaten the sustainability of CCAs and the conservation effort (Pathak, 2009; Malhotra *et al.*, 2007). Similarly,

the rapid transformations taking place in the social, economic and cultural environment are impacting upon CCAs in a big way. For instance, it is observed in several places, the young generation may not necessarily be as interested in community-led conservation efforts as their elders.

On the external front, CCAs also face the onslaught of urbanization, industrialization and alienation of conserved areas for infrastructure development projects. At several places, CCAs are impacted on by invasive species and the outbreak of plant and animal diseases. Illegal extraction of timber, reported by a large number of CCAs, is another well-documented threat. Shrinking wild habitats lead to increase in human-animal conflicts, which in turn threatens continuity of the conservation effort by the communities.

BOX 4.5: Internal and external challenges to CCAs

Internal challenges	External challenges
<ul style="list-style-type: none"> ● Social inequities: Existing social inequities like class, caste etc. may lead to exclusion and affect the long-term sustainability of the initiative. ● Demographic changes: Increasing pressure on the remaining resource due to rising livestock and human population may lead to over-exploitation and conflicts. ● Changing value systems and aspirations: With changes in livelihoods and increasing migration from rural to urban areas along with changing social norms and aspirations, it may be a challenge to sustain community-driven conservation practices. ● High cost of conservation: While communities have internalized many of the costs for conservation, they find it difficult to bear monetary and sometimes non-monetary costs of conservation that affect their livelihoods. In the absence of support from outside, conservation initiatives by the community are at risk. 	<ul style="list-style-type: none"> ● Lack of legal backing and lack of tenurial security: At present there is no specific policy or law related to CCAs. At several places, access rights are not codified and in such situations once the land use is changed, the community's effort is wasted. ● Inappropriate or no government support: In the absence of any formal policy by the government, officials find it hard to support CCAs. Usually, government policies supporting community conservation efforts follow standardized approach, which may not be suitable for functioning of community-based institutions. ● Large development projects and processes: With emphasis on economic development, CCAs are now facing challenges from mega development projects and market pressures. ● Smuggling and poaching: In areas where CCAs harbour economically valuable species of flora and fauna, there is a larger challenge of illegal felling and smuggling of rare plants and animals. ● Pilgrimage and tourism: Many big SGs are frequented by a large number of pilgrims and tourists. This puts pressure on the natural vegetation of SGs.

Source: Pathak, 2009 and Malhotra *et al.*, 2007.

India is yet to frame comprehensive laws for recognizing the effectiveness of CCAs or SGs. Most importantly, insecurity over land tenure threatens the whole initiative itself. For instance, several CCAs across India exist on land owned by government, and the local community's right of access is not always recognized. Moreover, if the land use is changed for any other purpose, it jeopardizes years of the community's effort in conservation.

While there have been cases where individual government officials have encouraged and supported community initiatives, given the absence of land security, it becomes very difficult for local communities to garner support for conservation. It becomes impossible, for example, to deal with issues of encroachment, hunting or illegal extraction of commercially viable resources. There is a need for a systematic approach and framework, at the level of both policy and law, if CCAs and SGs are to survive. Such approaches or policies need to follow flexible frameworks in which communities remain at the centre and their efforts are facilitated and not hindered.

Way forward

The relevance and importance of community-based conservation cannot be overemphasized. An expert panel constituted by the Ministry of Environment and Forests in 2009 made several suggestions for the management of CCAs (see Box 4.6). To start with, it is important to document and understand the scale and nature of community-based conservation initiatives across the country. Such inventories would aid in understanding the context of, motivation for, and support needed by CCAs to continue their efforts. The documentation would also help in gathering information about traditional knowledge and practices, and disseminate it to the larger conservation community.

Further, the legal and policy framework needs to be strengthened to recognize conservation efforts by local communities and also to provide them with security of tenure over the area that they have been conserving.



Photo: Foundation for Ecological Security

BOX 4.6: Suggestions for supporting CCAs

- Providing greater recognition and support by developing a national level database of CCAs; documenting cases of CCAs and awarding exemplary initiatives; developing information base (including maps) and making information available to communities to help them prepare management plans for CCAs, and to take informed decisions regarding use and management; and creating national, state or sub-state systems and institutions for continuous support and guidance to CCAs.
- In case the communities desire, CCAs can be recognized under the available laws like the Indian Forest Act (as village forests), the Wildlife (Protection) Act, 1972 (as Community Reserves and Conservation Reserves) or state-specific laws such as the Village Council Act of Nagaland. The legal status of CCAs may not be changed unless the community agrees on this and is fully aware of the implications of such a change.
- Providing financial and in-kind support for conflict resolution; recognizing local institutions and their rules/ regulations/ systems; preparation of management plans; improving ecologically appropriate livelihoods; and facilitating non-exploitative linkages with markets.
- Strengthening local institutions by facilitating greater equity and transparency in the decision-making process, and supporting CCAs against larger threats of powerful offenders (smugglers, poachers) and development-induced deforestation.
- Providing support in reducing human-wildlife conflict by technical or financial means.

Source: MoEF, 2009.



The Biological Diversity Act is one such law that provides opportunities to communities to form local institutions such as Biodiversity Management Committees (BMCs) for the management, protection and documentation of local biodiversity. Similarly, the opportunities provided by the Forest Rights Act and the Wildlife (Protection) Act could be utilized to strengthen CCAs if communities desire so (see Table 4.2 and Chapters 3 and 7 for details).

The mechanisms and lessons drawn from a particular CCA need to be shared with the larger CCA community and for this, CCA networks at various levels would be desirable. These sub-state, state-level and national-level networks of CCAs would not only provide a platform for shared learning but also suggest the nature of support needed and advocate policy options. Concerted efforts are needed to ensure that CCAs survive and thrive.

Endnotes

- ¹ In a recent review of over 100 articles, the single most frequently cited measure for adaptation to climate change is the expansion of the number and coverage of protected areas (Ervin *et al.*, 2010).
- ² The list includes institutions of community forest management in Odisha. The number is particularly high in Odisha as organizations working closely with the local communities on conservation aspects are able to provide relevant information. In Madhya Pradesh, the number is based on limited field visits and interviews. The actual number of CCAs may be much higher (UNDP and MoEF, 2012).
- ³ In India, besides the allopathic system, several other health systems are in practice; these are *Ayurveda*, *Yoga*, *Naturopathy*, *Siddha*, *Sowa-Rigpa*, *Unani*, Homoeopathy and numerous indigenous herbal medicine practices.

Territorial Forests – A Multiple-use Resource Base

5

Territorial forests play an important role in the social, cultural, ecological and economic well-being of the country. They are repositories of biological diversity and provide critical ecosystem goods and services. Important economic activities such as agriculture, animal husbandry, and fishing rely on forests. Territorial forests provide livelihoods to a large number of people. They are a source of raw material to forest-based industries and act as a bulwark against climate change. As a multiple-use resource, territorial forests will play a decisive role in balancing the demands of conservation and development in the years to come.

Introduction

India accounts for 1.7 percent of global forest cover, making it one of the top 10 forest-rich countries in the world (FAO, 2010).¹ Covering more than a fifth of the country's geographical area, forests constitute the second largest land use after agriculture. A large part of India's forests are under the ownership of state Forest Departments. Another significant part is under community forest management (especially in the North East) (see Chapter 7) and CCAs (see Chapter 4).²

This chapter deals with governance of forests that are under the control of state Forest Departments and follow multiple-use management objectives such as biodiversity conservation, timber and NTFP production, supply of raw materials to forest-based industries, and sustenance to forest-dependent communities. To make a distinction from other governance models described in this book, these multiple-use forests are called territorial forests. Protected areas are excluded from the purview

of this chapter as they do not have timber production as a management objective. Joint Forest Management (JFM), though operating in territorial forests, is a separate governance arrangement (described in detail in Chapter 6) and hence is not covered in this chapter.

Territorial forests encompass a broad spectrum of habitats – pristine primary forests, secondary growth forests, forests inter-planted with commercially valuable native species, and commercial exotic plantations. Among the five governance models described in this book, territorial forests cover the largest area.³ They form an important element of India's biodiversity governance framework. In the context of biodiversity conservation, territorial forests are important because they: 1) include the richest repositories of biological diversity and provide vital ecosystem services (particularly as the source of most of India's rivers); 2) ensure linkages in the landscape between protected areas and other high-value biodiversity areas (corridors for genetic flow and 'escape routes' in the context of climate change); 3) meet livelihood needs of a large number of forest-dependent



Photo: Manoj Chandran

communities and save them from the vicious cycle of poverty and environmental degradation (that would have resulted in significant biodiversity loss); 4) act as biomass catchments and ease pressure on biodiversity-rich forests for timber and other forest products; and 5) play a crucial role in climate change mitigation by storing and sequestering a significant amount of carbon. This chapter provides an overview of territorial forest governance in India – its importance, categories, management objectives, institutional arrangements, good practices, challenges and the way forward.

Photo: Manoj Chandran



Territorial forests and biodiversity conservation

In the discourse of biodiversity conservation, the role of territorial forests is often overlooked. Biodiversity conservation is an important objective of territorial forest governance. India's territorial forests encompass a wide array of habitats that range from tropical evergreen forests in Andaman and Nicobar Islands, the Western Ghats and North Eastern states to dry alpine scrub in the Himalayas. Between these two extremes, there are semi-evergreen forests, deciduous forests, thorn forests, subtropical pine forests, temperate montane forests, mangroves etc. (Lal, 1989). Champion and Seth (1968) classified India's forests into five major groups based on climatic factors, which were further divided into 16 groups on the basis of temperature and moisture content. These were further divided into forest types.⁴ Table 5.1 lists the different forest types and the proportion of forest cover under them (also see Box 5.1). Tropical dry

TABLE 5.1: Forest cover under different forest types

Forest type	Percentage of forest cover (%)
Group 1 – Tropical wet evergreen forest	2.92
Group 2 – Tropical semi evergreen forest	13.79
Group 3 – Tropical moist deciduous forest	19.73
Group 4 – Littoral and swamp forest	0.69
Group 5 – Tropical dry deciduous forest	41.87
Group 6 – Tropical thorn forest	2.25
Group 7 – Tropical dry evergreen forest	0.13
Group 8 – Subtropical broadleaved hill forest	2.69
Group 9 – Subtropical pine forest	2.63
Group 10 – Subtropical dry evergreen forest	0.03
Group 11 – Montane wet temperate forest	0.69
Group 12 – Himalayan moist temperate forest	4.12
Group 13 – Himalayan dry temperate forest	0.84
Group 14, 15, 16 – Sub alpine and alpine forest	2.55
Plantation / trees outside forest	5.07
Total	100.00

Source: FSI, 2011.

BOX 5.1: Classification of forests for assessment

In India, the term 'forest area' or 'recorded forest area' refers to the geographic area classified as 'forest' in government records. These include reserved and protected forests constituted under the Indian Forest Act, 1927 and all areas recorded as 'forests' as per revenue records and/or State or local law. The term 'forest area' in these records denotes the legal status of land. The term 'forest cover' refers to all lands encompassing more than one hectare and containing more than 10 percent of tree canopy. The Forest Survey of India (FSI) in its 'State of Forest Reports' categorizes area under 'forest cover' as: (i) very dense forest (with 70 percent density of tree canopy); (ii) moderately dense forest (with 40 to 70 percent density of tree canopy); and, (iii) open forest (with 10 to 40 percent density of tree canopy). If an area is covered by less than 10 percent tree canopy, it is classified as scrub.

Source: FSI, 2011.

deciduous, moist deciduous and semi-evergreen forests account for over 75 percent of the total forest cover.

Territorial forests are home to some of the world's most unique flora, fauna and ecosystems. In several places, the biodiversity value of territorial forests is comparable to protected areas. For instance, the *Dipterocarpus-Mesua-Palaquium* vegetation type in the wet evergreen forests covers an area of 11,660 km² and has a plant diversity of about 1,700 species. The *Tectona-Lagerstroemia lanceolata-Dillenia-Terminalia paniculata* vegetation association of the wet evergreen and teak transition zone has about 1,500 plant species in approximately 12,400 km² of area (Gadgil and Meher-Homji, 1990).

India's territorial forests harbour mega fauna like Royal Bengal tiger (*Panthera tigris tigris*), Asiatic lion (*Panthera leo persica*), Asian elephant (*Elephas maximus*), Leopard (*Panthera pardus*), and Sloth bear (*Melursus ursinus*). A variety of deer and antelope species found across the territorial forests include the Indian gazelle (*Gazella bennettii*), Blackbuck (*Antelope cervicapra*), Four-horned



Photo: N.A. Naseer

antelope (*Tetracerus quadricornis*) and Swamp deer (*Cervus duvaucelii*). These forests are also home to Wild buffalo (*Bubalus arnee*) and Indian bison or Gaur (*Bos gaurus*). Territorial forests have a high degree of endemism and harbour nearly all of India's 36 endemic mammals. Among them are Lion-tailed macaque (*Macaca silenus*), Nilgiri langur (*Trachypithecus johni*), Brown palm civet (*Paradoxurus jerdoni*) and Nilgiri tahr (*Nilgiritragus hylocrius*). Endemic bird species found in territorial forests include Andaman serpent eagle (*Spilornis elgini*), Nilgiri wood pigeon (*Columba elphinstoni*), and Mishmi wren-babbler (*Spelaeornis badeigularis*) (IC Net, 2011; Alfred, 2006; Ali, 2002).

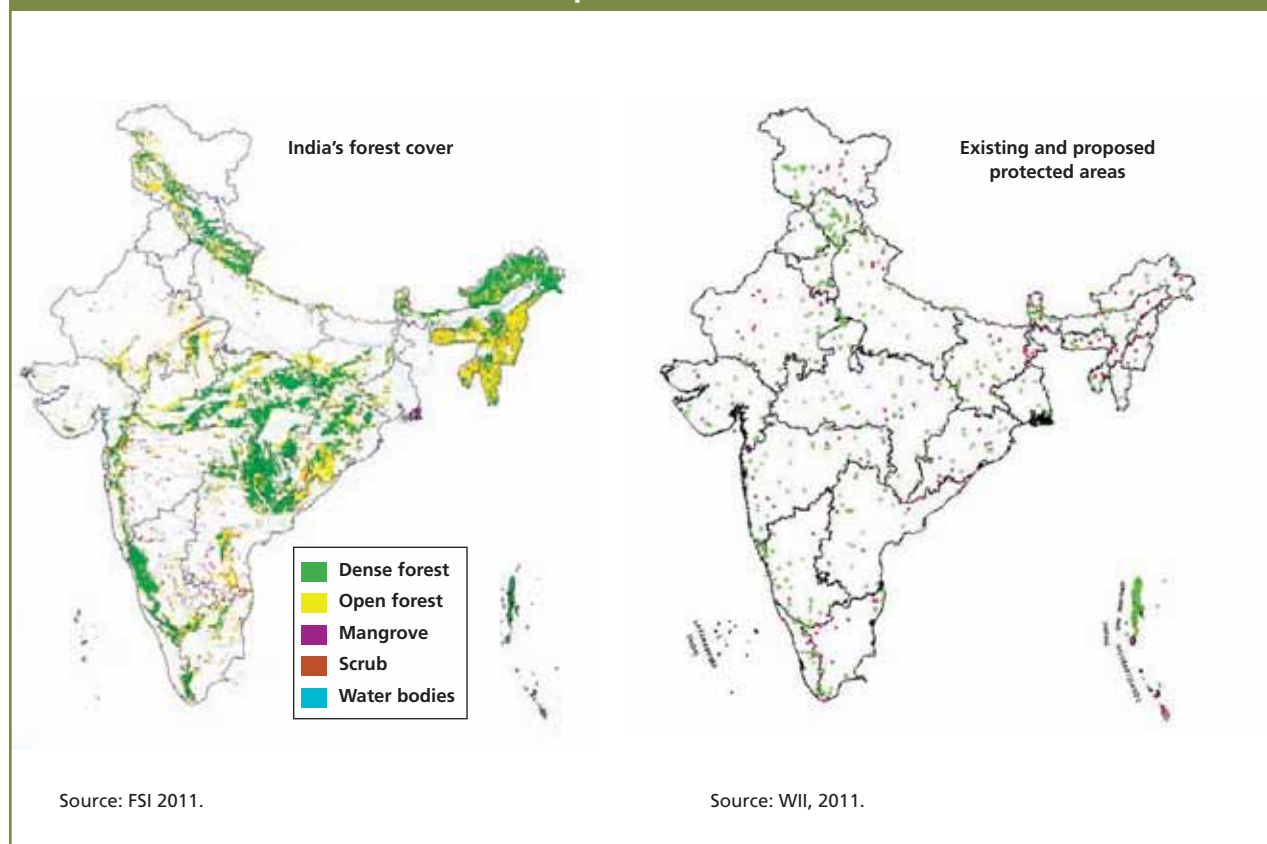


Photo: Girish Kumar

As discussed in Chapter 3, formally designated protected areas still do not cover a large part of India's biological diversity. They mostly exist as scattered and fragmented entities. Figure 5.1 shows a comparative picture of coverage of protected area network vis-à-vis India's forest cover. It is evident that territorial forests play a vital ecological role by ensuring connectivity between protected areas and other high-value biodiversity areas.

Depending on biodiversity value, resource-use patterns and human-nature interface, India's territorial forests (barring poor commercial forest plantations) could be classified under various IUCN categories of protected areas (see Chapter 1 for details). This would help in more accurately reflecting the extent of areas under conservation planning in the country against global benchmarks of protected area planning.

FIGURE 5.1: India's forest cover and protected area network



Territorial forests and non-timber forest products

The livelihood support provided by territorial forests has a significant bearing on biodiversity conservation. One of the objectives of territorial forest governance is to provide means of livelihoods based on sustainable resource use and thus prevent overexploitation of biodiversity-rich areas that would lead to ecosystem degradation and eventual biodiversity loss. Territorial forests provide a significant quantum of NTFPs in the form of fuel wood, fodder, medicinal plants etc. Approximately 27 percent of the country's population is dependent on NTFPs for their sustenance and livelihood. This reliance is particularly high among 89 million indigenous people who live in the forests (Planning Commission, 2011b; World Bank, 2006). The dependence of tribal communities on NTFPs becomes very high during non-cultivation seasons and periods of uncertain agricultural yields.

About 17 percent of landless labourers depend on NTFPs to make ends meet (NFC, 2006; UNDP 2011). Non-

timber forest products generate employment, provide substantial income and enable rural communities to offset vulnerabilities (including climate change). Non-timber forest products are estimated to contribute up to 60 percent of household income in some of the poorest rural villages in India (UNDP, 2011).

For instance, estimated value of NTFPs realized per household per year varies between INR 3,445 in the evergreen zones and INR 1,233 in the dry deciduous zones in the country (Murthy *et al.*, 2005). Similarly, an estimated 60 to 80 percent of India's population, particularly the rural population, relies substantially on medicinal plants found in territorial forests for health care (UNDP, 2012). If planned and harvested sustainably, NTFPs can meet subsistence needs of forest-dwelling and forest-fringe communities, thereby easing pressure on biodiversity.

Apart from their importance for livelihoods of forest-dwelling and forest-fringe communities, some NTFPs are also commercially important (a few are listed in Box 5.2).



Photo: Foundation for Ecological Security

BOX 5.2: Commercially important NTFPs in India

Collection of tendu (*Diospyros melanoxylon*) leaves, used as wrappers for making *bidis* (hand-rolled cigarettes) supports about 10 million people. Other important NTFPs traded widely include seeds of Sal (*Shorea robusta*); fruits of Indian gooseberry or Amla (*Emblica officinalis*); Baheda (*Terminalia bellirica Roxb*); Harra (*Terminalia chebula*); kernels and seeds of *Buchanania lanzans*; roots like Satavar (*Asparagus racemosus*); *Chlorophytum borivilliana*; gums from *Boswellia serrata* and *Sterculia urens*; flowers and seeds of *Madhuca longifolia*, *Taxus*, *Agalochha* sp., *Celastrus paniculata*, *Andrographis paniculata*, and *Helicteres isora*.

Source: FAO, 2009.

Since the collection, processing and trade in NTFPs occur largely in informal and unorganized markets, it is difficult to arrive at a correct assessment of the actual production/collection, procurement, scale and volume of trade transactions. According to one estimate, NTFPs account for 68 percent of total exports from the forestry sector in India. Further, India's share in global medicinal plants trade (growing currently at the rate of 23 percent annually) has increased steadily. In 2009, India was the third largest exporter of medicinal plants in the world (FRLHT, 2012; UNDP, 2012).

Of the 7,000 plants used in Indian systems of medicine, 960 have been recorded in trade, of which 178 are traded in high volumes (Planning Commission, 2011b). Overexploitation of NTFPs and medicinal plants from territorial forests constitutes a significant threat to biodiversity. Some estimates show that more than 70 percent of extraction of medicinal plants from the wild is through destructive harvesting (e.g. *Taxus baccata*, and *Swertia chirayita*) (FRLHT, 2012; Planning Commission, 2011b).

The importance of NTFPs in India is recognized by two landmark laws: 1) the Panchayats (Extension to the Scheduled Areas) Act, 1996 and 2) the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 that provide more secure rights over NTFPs to tribal communities (see Chapter 7).

Territorial forests and commercial plantations

Territorial forests, particularly forest plantations, play an important role in reducing pressure on biodiversity-rich forests by supplying timber and other forest products. India has considerable area of territorial forests under plantations (32.57 million hectares), which accounts for 17 percent of the global forest plantation area and is the second largest in the world after China. It has the largest share in the global plantation of teak (44 percent). Other main plantation species are eucalyptus, poplars and acacias (FAO, 2009).

Approximately 3.175 million m³ of wood and 1.232 million tons of fuel wood are produced by territorial forests every year. The supply of timber from territorial forests, however, is not enough to meet the domestic and commercial requirement of wood of the country. Nearly 854 million people in India use fuel wood as a source of energy for cooking or heating, of which about 200 million (over 23 percent) use fuel wood sourced from forests (FSI, 2011). Of an estimated annual consumption of 250-300 million m³, only about 17 million m³ of fuel wood come officially from forests (MoEF, 2009). Part of this deficit is met by unorganised sourcing of wood from forests and also from trees outside forests. It is estimated that trees outside forests have the potential of providing 42.774 million m³ of wood (see Box 5.3) (FSI, 2011).

The growing stock of India's forests and tree cover combined is estimated at 6,047.15 million m³ (4,498.73 million m³ in forests and 1,548.42 million m³ outside) (FSI, 2011). However, compared to the global average of 2.1 m³/hectare/year, the productivity of India's forests is significantly low, with estimates ranging from 0.7 to



Photo: Nagaraj B.N.

BOX 5.3: Consumption of wood in India

Wood is consumed either at wood-based industries or at household level.

- There are 55,731 saw mills in India that consume 22.9 million m³ of wood
- There are 3,457 plywood and veneer units that consume 19.9 million m³ of wood
- Commercial units that use wood for construction consume 99.7 million m³ of wood
- Commercial units that use wood for furniture and fixtures consume 33.2 million m³ of wood
- Households directly consume:
 - 340.2 million m³ of wood for house construction
 - 58.4 million m³ of wood for furniture
- Individuals consume 58.75 million tons of fuel wood from forests

Source: FSI, 2011.

1.34 m³/hectare/year. This is mainly due to non-recycling of biomass, forest fires, grazing and other factors that continue to degrade forest cover (NFC, 2006). Low productivity coupled with high dependence for subsistence and commercial demand leads to mounting pressure on biodiversity.

Agroforestry, farm forestry, social forestry and imports play an important role in bridging the gap between demand and supply of wood. Since the 1980s, the Indian government has been promoting agroforestry,⁵ farm forestry and social forestry. While agroforestry is a traditional practice, farm forestry and social forestry (tree planting on private lands, village common lands and barren/wastelands) originated with the recommendations of the National Commission on Agriculture in 1976. During 1980s, these programmes had a massive pan-Indian coverage. Outcomes of these programmes depend a great deal on the presence of supportive policies and farmers' tie-ups with private companies for extension and marketing (IC Net, 2011; NFC, 2006).



Photo: Nagaraj B.N.

Forests and climate change

India's Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) (MoEF, 2012) presents different scenarios of climate change impact on forests. Climate change is predicted to exacerbate the vulnerability of forests that are already under considerable strain from multiple stress factors. These include change in ecosystem types, species-assemblages, net primary productivity, possible die-back of forests in the transient phase and accelerated biodiversity loss. By the 2050s, most of the forest biomes in India are likely to remain sub-optimally adapted to their existing locations (MoEF, 2010; MoEF, 2012). These changes will have significant implications – both ecological and socio-economic.

On the other hand, India's forests are the first line of defence against climate change. As a climate change response option, forests have multiple utility in adaptation as well as in mitigation. The Green India Mission, one of the eight Missions under the National Action Plan on Climate Change, 2008 (NAPCC) is an important programme to realize this potential of forests (see Box 5.4). To translate the imperatives of NAPCC to

BOX 5.4: National Mission on Green India

National Mission on Green India aims to address climate change by enhancing carbon sinks in sustainably managed forests and ecosystems, enhancing the resilience and ability of vulnerable species/ecosystems to adapt to the changing climate and enabling adaptation of forest-dependent communities in the face of climatic variability. There are three main objectives of the Mission: 1) doubling the area under afforestation/eco-restoration in India in the next 10 years (total area to be afforested/eco-restored to 20 million hectares); 2) increasing the green house gas (GHG) removal by India's forests to 6.35 percent of India's total annual GHG emissions by the year 2020; and 3) enhancing the resilience of forests/ecosystems.

Source: MoEF, 2012.



Photo: Samaj Pragati Sahayog

ground level action, state governments are currently formulating State Action Plans on Climate Change (SAPCCs). Ecosystem-based approaches, largely related to forestry, are identified as a major thrust area to combat climate change under these plans.

India's forests have enormous potential for carbon sequestration. From 1995 to 2005, the carbon stock in India's forests and trees increased from 6,245 million tons to 6,662 million tons, registering an annual increment of 38 million tons of carbon or 138 million tons of CO₂ equivalent. Allocating a conservative value of US\$ 5 per tonne of CO₂ locked in India's forests, this huge sink of about 24,000 million tons of CO₂ is worth US\$ 120 billion (MoEF, 2009c).

Internationally, India has been advocating for a comprehensive framework that provides incentives not only for Reducing Emissions from Deforestation and Degradation (REDD), but also for forest conservation, sustainable forest management and enhancement of forest carbon stocks – the REDD Plus approach.

Forests in national resource accounting

Territorial forests provide a wide range of benefits. In addition to products like timber, fuel wood, fodder and NTFPs, they provide ecological services like biodiversity conservation, regulation of the hydrological cycle, nutrient cycle, control of erosion, groundwater recharge, carbon sequestration etc. Official statistics indicate that the contribution of forests (largely logging) to India's GDP has varied from 1.0 to 1.5 percent during the nine-year period from 1993-1994 to 2002-2003, but thereafter by 2005-2006, it had fallen to 0.7 percent (NFC, 2006). However, the contribution of forests to India's GDP is grossly under-estimated as it is based on only a proportion of timber and other tangible products that are extracted through recorded market transactions (Planning Commission, 2011). Ecological services and a large proportion of NTFPs provided by forests are seldom reflected in macro-economic calculations. If these were to be accounted for, the contribution from forests to the country's GDP would be much higher.

For reflecting the true value of territorial forests in the national income, it is imperative to conduct natural resource accounting (NRA)⁶ (NFC, 2006; FAO, 2009). Studies on forest valuation and resource accounting in India are slowly becoming available. The range of annual values of select benefits (tangible and intangible) of Indian forests, derived from different studies, is shown in Table 5.2.

In 2011, MoEF initiated a countrywide programme to quantify and value various ecosystem services provided by select ecosystems through an All India Coordinated Project involving 16 institutions. The ecosystem services being quantified are biodiversity, hydrology, carbon sequestration, nutrient cycling, pollination, health, culture, NTFPs and wood biomass (MoEF, 2012b). To mitigate loss of forests and ecosystem services due to diversion of forest land for non-forestry purposes, India has created a Compensatory Afforestation Fund Management and Planning Authority (CAMPA) (see Box 5.5).

BOX 5.5: Compensatory Afforestation Fund Management and Planning Authority (CAMPA)

The Forest (Conservation) Act, 1980 specifies conditions for diversion of forest land for non-forestry purposes. Projects that are approved for diversion of forest land are required to pay compensation for afforestation work. In 2006, the Indian Supreme Court issued orders for creation of CAMPA to collect funds based on 'Net Present Value', which is a quantification of environmental services provided by the diverted forest area. It was also decided to create state-level CAMPAs. The funds available with state CAMPAs are used for development, management and protection of forests and wildlife. Of the received funds of approx. INR 1,30,000 million, state CAMPAs have so far been allocated approx. INR 7,300 million.

Source: GoI, 2011 and MoEF, 2009b.

TABLE 5.2: Annual value of select benefits of forests

Economic benefit	Nature of benefit	Value of annual flow of goods and services (INR/ha)	
		Minimum	Maximum
Ecological functions (watershed)	Intangible	624	2,00,000
Carbon store	Intangible	20,125	1,20,000
Eco-tourism	Intangible	676	20,444
Timber	Tangible	2,701	9,270
Non-timber forest product	Tangible	538	2,957

Source: Manoharan, 2000.

Evolution of forest policy and law

Organized management of territorial forests in India was initiated during the colonial era with the appointment of the first Inspector General of Forests, Dr Dietrich Brandis in 1864. The historical trajectory of laws and policies governing territorial forests mirrors the transition from production forestry in the colonial and post-Independence period (till the 1970s), to conservation and community forestry thereafter. As mentioned earlier, the overarching objective of colonial forest management was to maximise revenue for the State. Until the mid-19th century, a large amount of timber was sourced from territorial forests for ship building, iron smelting and expansion of the railway network. This, combined with conversion of forests into agriculture land, led to massive exploitation of territorial forests. However, after the enactment of the National Forest Policy in 1988, there was a perceptible shift in this approach.

The National Forest Policy, 1988 brought in radical changes to the objectives of territorial forest management. The paradigm of forest governance shifted its focus from sustained yield management to sustainable forest management (SFM).

Today, the principle of SFM is central to all forest sector programmes and forest working plans. The Indian Institute of Forest management (IIFM), Bhopal developed criteria and indicators (C&I) for SFM. There are eight criteria (including ecosystem function and vitality, and biodiversity conservation) and 43 indicators that are flexible and can be modified/ deleted/ added depending upon local conditions. The process of adapting the C&I for various forest types is currently under way (MoEF, 2007).

The evolution of legal and policy instruments related to the governance of territorial forests in India is given in Box 5.6.



Photo: High Range History Collection

BOX 5.6: Evolution of legal and policy instruments for governance of territorial forests in India

<p>Indian Forest Act, 1865 and 1927</p>	<p>The first Indian Forest Act passed in 1865 paved the way for organized forest management in the country. A revised Act in 1878 additionally provided for the delineation of reserved and protected forests. The Indian Forest Act of 1927 remained in force after Independence and forests were included in the State list under the Indian Constitution, i.e. states were empowered to legislate on matters related to forests independently. The 42nd Amendment Act of the Indian Constitution in 1976 transferred the subject of forests to the Concurrent List, thereby empowering the central government to play a more direct role in the management of territorial forests and the regulation of activities therein (MoEF, 2007; NFC, 2006; Pathak, 1994).</p>
<p>National Forest Policy, 1894 and 1952</p>	<p>The first National Forest Policy in 1894 was based on Dr. John Augustus Voelcker's report on <i>Improvement of Indian Agriculture and Review of Forest Administration in British India</i>. The policy prescribed maintenance of adequate forests for the preservation of climatic and physical conditions in the country. Requirements of local population were to have precedence over revenue considerations. The first post-Independence National Forest Policy (1952) stressed on having 33 percent of land area of the country under forests. Its focus, however, remained on sustainable timber production, even as it recognised the contribution of forests in watershed management, improving soil fertility, and agricultural productivity (MoEF, 2007).</p>
<p>Wildlife (Protection) Act, 1972</p>	<p>It provides a powerful legal framework for prohibition of hunting, protection and management of wildlife habitats, establishment of protected areas, regulation and control of trade in parts and products derived from wildlife, and management of zoos. Certain provisions of the Wildlife (Protection) Act also apply to territorial forests (see Chapter 3 for more details).</p>
<p>Forest (Conservation) Act, 1980</p>	<p>Enacted to check wanton destruction of forests, the Forest (Conservation) Act stipulates prior approval of the central government for diversion of forest land for non-forestry purposes. Moreover, the diversion is allowed only against compensatory afforestation in an equivalent area of non-forest land, or double the area in degraded forest lands. In 1988, the Act was amended to make the provisions more stringent, and revised comprehensive rules and guidelines were issued in 1992 (NFC, 2006).</p>
<p>National Forest Policy, 1988</p>	<p>The 1988 National Forest Policy marks a major departure from the policy of 1952 with its emphasis on conservation and recognition of benefits to local people. Reiterating the national target of expanding forest and tree cover to 33 percent of the total area of the country, the policy gives high priority to conservation of existing forests and restoration of degraded forests. The policy also advocates people's participation in forest management along with promotion of farm forestry and agroforestry on private lands (MoEF, 2007).</p>
<p>Joint Forest Management Policy Circulars, 1990</p>	<p>Under JFM, the Forest Department and the village community jointly protect and manage forests. The community gets greater access to NTFPs and a share in timber revenue. In return, it accepts increased responsibility for protection of forests from fire, grazing, illegal harvesting and poaching. A micro-plan, which consists of prescriptions for forest management and village development activities, is prepared and the Forest Department provides funds for its execution (see Chapter 6).</p>

contd...

**National
Forestry Action
Programme,
1999**

Prepared after elaborate consultations, NFAP highlighted five main action areas: (i) protection of existing forests; (ii) improvement of forest productivity; (iii) reduction of total demand on forests; (iv) strengthening policy and framework; and (v) expansion of forest area (MoEF, 1999).

**Forest Rights
Act, 2006**

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, provides a legal framework to: (i) vest forest rights with forest-dwelling Scheduled Tribes and other traditional forest dwellers⁷; (ii) define types of forest rights; and (iii) define the procedure for vesting such rights. The holders of forest rights, the Gram Sabha or village assembly as defined by the Act, and the village level institutions are empowered to: 1) protect wildlife, forests and biodiversity; 2) ensure that adjoining catchment areas and other ecologically sensitive areas are adequately protected; 3) ensure that habitat of right-holders is protected from destructive practices; and, 4) ensure that decisions taken in the Gram Sabha to regulate access to community forest resources and stop any activity which adversely affects forests, wildlife and biodiversity, are complied with (IC Net, 2011).



Photo: N. Vasudevan

Governance institutions

Under the central government, MoEF is responsible for the management of territorial forests. Under the overall supervision of the Director General of Forests, the administration of territorial forests is headed by the Additional Director General of Forests (Forest Conservation) to provide policy guidelines, advice on technical and management issues, and oversee implementation of various centrally sponsored schemes.

In the states, the Forest Department is headed by a Principal Chief Conservator of Forests (Head of Forest Force), who is assisted by other Principal Chief Conservators of Forests (PCCFs), Additional PCCFs and Chief Conservators of Forests for handling responsibilities like production, conservation, protection, development, working plans, research, budget, planning, policy, ecocodevelopment and tribal welfare, social forestry and community forestry, forest management information systems, human resource management, vigilance and administration. Territorial forests are divided into territorial Circles and below them, territorial Forest Divisions. Divisions are further sub-divided into Ranges, Sections and Beats (the basic units of forest administration on the ground). Apart from territorial Circles, there are also

functional Circles that deal with research, working plan, social forestry, vigilance, and education and training.

India is one of the first countries in the world to have established an organized forest service for the management of forests. The Imperial Forest Service created in 1867 evolved into the Indian Forest Service (IFS) in 1966 to provide trained personnel for senior managerial positions in the forestry sector and to maintain uniform standards of forest administration across the country. Judicial interventions have also influenced the framework of forest governance in the country in a significant manner. The Supreme Court's judgments on forestry and wildlife have not only infused a fresh perspective to the sector, but have also resulted in refinement and development of forestry practices and principles (ELDF and WWF India, 2009) (See Box 5.7).

Following the recommendations of the National Commission on Agriculture in 1976, many state governments set up Forest Development Corporations (FDCs) to cater to commercial aspects of forestry. Along with the original mandate of timber harvesting, wasteland afforestation, promotion of commercial tree plantations and cash crops, the FDCs now cover issues relating to NTFP marketing, ecotourism, training of forest personnel and rehabilitation of displaced forest communities.



Photo: ICFRE

BOX 5.7: Judiciary and forests

The judiciary has been instrumental in evolving a comprehensive definition of 'forests' and regulating tree felling in accordance with the working plans. The intervention of the Supreme Court has also helped in the closing down of all unlicensed wood-based industries and prompted development of the concept of 'Net Present Value' (NPV) in the context of diversion of forest land for non-forestry purposes. Besides, the Indian Supreme Court employed several innovative practices to deal with forest-related issues such as the appointment of *Amicus Curiae*,⁸ expert committees of various types including 'committees of inquiry', fact-finding missions and quasi-judicial bodies. In 2002, the Supreme Court set up the Central Empowered Committee (CEC) for monitoring the implementation of the Court's judgements on forest matters.

Source: ELDF and WWF India, 2009.

Governance practices

Working plans: managing territorial forests at field level

India's territorial forests are managed through working plans prepared for each territorial division. The National Working Plan Code, 2004 provides detailed guidance for the preparation of working plans. Based on the principles of SFM, working plans are generally prepared for a period of 10 years. Part I of the plan presents the summary of facts on the status, quality, composition, growing stock, socio-economic status of forest dwellers, and pressure on forest resources. Part II describes future management strategies with prescriptions for operations, which in addition to generating revenue for the State also have a direct bearing on the ecological, environmental and socio-economic development of communities, particularly those who are directly or indirectly dependent on forests (MoEF, 2007).



Photo: Anoop E.V.

Working plans are prepared after a rigorous process. To start with, extensive forest resource information is gathered that includes forest inventory assessment, growing stock and yield data. Forests are divided into different working circles to achieve various management objectives, which define management interventions for specific forest types. Working circles can overlap to provide flexibility for management treatments within each forest division. Some common working circles are: rehabilitation (managing natural regeneration); protection (from fire, grazing); bamboo (managing bamboo stands); reclamation (reforesting old mining areas); enrichment planting; improvement (thinning of existing forests); and plantations (major planting operations). Once approved by the Regional Offices of the MoEF, working plans form the basis for all forestry works to be undertaken over the next decade. Collectively, working plans inform the forestry sector on budget allocations from the state and central government (MoEF, 2007; World Bank, 2006).

Assessment of forest cover

India has institutionalized a mechanism for periodic assessment and monitoring of forest resources. Since 1987, FSI has been undertaking this exercise bi-annually. The first ever forest cover mapping was carried out using Landsat images between 1981 and 1983 at a scale of 1:1 million. The result of this assessment was published in the State of Forest Report, 1987. The

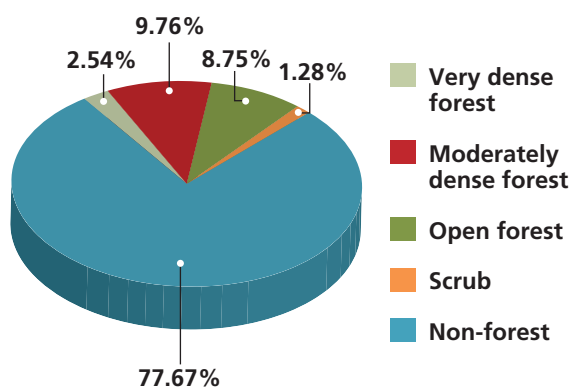
latest assessment, State of Forest Report, 2011 is the 12th assessment in the series. Over this period, remote sensing has undergone major advances in spatial and radiometric resolutions. The present interpretation scale of 1:50,000 and improved spatial resolution have made it possible to capture forest cover patches up to one hectare. Since 2003, digital interpretation has enabled classification of forest cover into three canopy classes (very dense, moderately dense and open forests). From 2001, FSI has been estimating tree cover outside recorded forest areas, which consists of sub-hectare tree patches. FSI has also conducted a nationwide assessment of total timber production from forests and trees outside forests, collection of fuel wood, consumption of fodder, utilization of timber and fuel wood in industrial units, household sector and small establishments (FSI, 2011).

According to the State of Forest Report 2011 (FSI, 2011), India has 78.29 million hectares (or 23.81 percent of geographical area) under forest and tree cover (including primary forests, forest plantations, tree gardens, community forests etc.). This includes 2.76 percent of tree cover outside forests, 0.4662 million hectares of mangroves and 13.96 million hectares under bamboo. These areas are largely found in the North East states, the Himalayan region, central India and the Western and Eastern Ghats (see Figure 5.1) (FSI, 2011). Figure 5.2 provides the current status of forest cover in India. Overall, India's forest cover has stabilized during the last decade (FAO, 2010).

Photo: Foundation for Ecological Security



FIGURE 5.2: Percentage of forest cover in India



Source: FSI, 2011.

Forest certification

The mechanism of forest certification promotes environmentally appropriate, economically viable and socially beneficial management of forests. Through the process of certification, the production of timber, wood, pulp products and NTFPs is monitored, traced and labelled against agreed standards. Forest management certification verifies that the forests /plantations from where the wood, fibre and other NTFPs are extracted are managed to a defined standard. It refers to two separate processes viz., Forest Management Unit certification (FMU) and Chain of Custody certification (COC). The latter is a process of tracking forest products from the certified forests to the point of sale to ensure that the product originated from a certified forest (MoEF, 2007).

At present, MoEF is in the process of establishing an Indian Forest Certification Council (IFCC). The proposed objectives of IFCC include the development of criteria and processes towards forest certification in India (MoEF, 2011; WWF, 2011). The Ministry of Textiles is providing support to secure forest certification for the wood handicrafts sector in order to meet the export demand. Forest certification in India through the Forest Stewardship Council (FSC) has increased from three COCs in 2006 to 328 at present. Of these, five certificates totalling 39,848 hectares are FMUs in areas managed by private and cooperative societies in four states (Tamil Nadu, Karnataka, Andhra Pradesh and Odisha).⁹

Research and training

India has one of the oldest forestry research and training institutions in the world. The Forest Research Institute was established in 1906 in Dehradun (in present day Uttarakhand) to impart training to Indian foresters, who till then as members of the Imperial Forest Service (between 1867 to 1926) were trained in France, Germany and Britain. Today, this role is being performed by the Indira Gandhi National Forest Academy at Dehradun. The Indian Council of Forestry Research and Education (ICFRE) deals with solution-based forestry research on emerging issues such as conservation of biological diversity, climate change, management of invasive alien species, combating desertification, increasing productivity of plantations, and sustainable forest management. ICFRE has eight regional research institutes and four research centres across the country.¹⁰ In addition, there are institutions at the state level like the state forest training schools, state forest research institutes and agricultural universities involved in forestry research, training and education. Some of the important national institutions involved in forestry research and training are listed in Annexure 11.



Photo: Manoj Chandran

Challenges and way forward

The three distinct medium term goals of territorial forest governance are to meet: 1) the subsistence requirement of forest-fringe communities for fuel wood, fodder, small timber and NTFPs through a system that ensures prevention of further degradation of the well-stocked areas and regeneration of the degraded areas; 2) the ecological requirements of biodiversity conservation, wildlife preservation and ecological goods and services (soil conservation, fertility management, maintenance of hydrology, disease and storm protection, culture, recreation etc.); and 3) the market requirements, including the needs of forest-based industries, through increased productivity of the existing forests and expansion of forest and tree cover by encouraging investments by all stakeholders, especially on private land holdings (NFC, 2006).

These goals have to be viewed against the multiple challenges thrown up by economic growth, climate change, and people's reliance on forests that India has

to balance. Major problems confronting the territorial forests are identified by NFAP (see Box 5.8) and a broader analysis of these issues is given in Chapter 8. The following section gives a brief account of these challenges:

Ecological challenges: India's forest productivity is significantly below the global average. Rapid land-use changes taking place around the forests (mostly on account of infrastructure investments like dams, roads and mines) have led to the fragmentation of forests and breaks in habitat continuity. This impedes genetic flow and cripples ecosystem functioning. An estimated 41 percent of India's forests have been already degraded, and dense forests are slowly losing their crown density. More than 70 percent of the forests have problems in regeneration and 55 percent are prone to fire. As much as 78 percent of the forest area is subjected to heavy grazing and other unregulated use (FAO, 2009; NFC, 2006). Climate change and proliferation of invasive species compound this situation. A large part of the territorial forests also encompass unique ecosystems and species with high conservation value. These areas need better conservation focus.

BOX 5.8: Major problems confronting territorial forest governance

- Loss of forests through diversion, forest fire and shifting cultivation, encroachment, degradation and declining forest productivity through over-use beyond sustainable limits.
- Inadequate investment in afforestation and forest protection, management, development and inability to fully implement multiple-use management objectives.
- Inadequate rural energy sources and unavailability of viable alternative energy to rural communities.
- High cattle population with low productivity in rural areas and inadequate fodder production resulting in very high grazing pressure on forest areas.
- Inadequate and ineffective participation of local communities and private initiatives in forestry and inadequate incentives and delivery mechanism in social forestry and JFM.
- Forestry legislation, institutions, programmes do not fully conform to goals and objectives envisaged in the National Forest Policy.
- Inadequate and non-prioritized forest research and extension in bringing knowledge and technology to field.
- Forestry education not abreast with the latest developments in the forestry sector.
- Organizational inefficiencies within national and state forestry organizations and inadequate linkages with related institutions.
- Lack of adoption of research findings in field operations.
- Inadequate knowledge and skills of field staff for handling scientific forestry operations.
- Inadequate strength of frontline staff in most of the states.
- Low priority to the sector in development planning.
- Inadequate inter-sectoral coordination and support.

Source: National Forestry Action Programme (1999) and personal communication with experts.



Photo: Manoj Chandran

Community-related challenges: India's territorial forests are the lifeline of its rural population. Pressure from unsustainable development, declining availability of forest products, lack of access to modern energy sources, and absence of viable economic and social alternatives all combine to drive the rural poor and tribal communities to heavy dependence on forests that often transcends the thresholds of sustainable yield. Despite the enactment of the Panchayats (Extension to the Scheduled Areas) Act, 1996, and the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, insecurity over land tenure and access to resources remains a problem for forest-dependent communities. Even in areas where JFM has attempted to create a level playing field in terms of codifying access rules and benefit-sharing arrangements, the results have been mixed. Further, markets for forest products (e.g. NTFPs) are asymmetrical and biased against the interests of local communities. There is also a need to rationalize the legislation on felling and transit of trees grown on private lands to encourage tree planting on non-forest

and private areas. Concerted efforts are needed to break these barriers and mobilize communities for the sustainable management of forests.

Institutional and capacity challenges: There is multiplicity of legal instruments existing in the realm of territorial forestry (e.g. the Indian Forest Act, 1927, the Forest (Conservation) Act, 1980, the Panchayats (Extension to the Scheduled Areas) Act, 1996 and the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006). Although these instruments have common goals (improved conservation and livelihoods), their harmonious implementation remains a challenge. Further, there is lack of effective land-use policies in forest-rich landscapes that result in persistent cross-sectoral issues and contradictory mandates of sectoral institutions. Other institutional and capacity related challenges include insufficient financial investment, inadequate knowledge base and technology, and the absence of incentive structures and extension support to farmers for agro/farm forestry.

The capacities of foresters, especially of the field staff, also require significant upscaling. It is also necessary to strengthen the forest knowledge management system (e.g. valuation of ecosystem services) that will help in making informed decisions.

Technology related challenges: India's forest-based industries encompass a wide range of small, medium and large-scale firms. The total industrial demand of wood, in terms of round wood equivalent (RWE) in India is expected to go up from 58 million m³ in 2000 to 153 million m³ in 2020. Forest-based timber processing industries are generally handicapped due to inefficient

operations, legal restrictions, low output, non-availability of skilled labour and resultant inertia (FAO, 2009). Wood processing units will need to modernize and improve their efficiency so as to meet the growing demand of wood and associated products. Similarly, deterioration in site quality and second-rotation decline in forest plantations have started impacting on the long-term performance of the forest production sector. Improving the performance of the forest production sector, including that of agroforestry and farm forestry will have significant implications for biodiversity conservation as it will ease considerable pressure on natural forests.

Endnotes

- ¹ According to the FAO's Global Forest Resources Assessment in 2010, 'forest area' refers to land spanning more than 0.5 hectares with trees higher than five meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in-situ*. It does not include land that is predominantly under agricultural or urban land use.
- ² The Indian Forest Act, 1927 defines two categories of forests: reserved forests and protected forests. The procedure of delineation of reserved forests is elaborate and oriented towards higher levels of conservancy and government control. Technically, nothing is an offence in protected forests unless it is specifically prohibited, whereas nothing is allowed in reserved forests unless specifically permitted. Areas recorded as 'forest' but not included under reserved forest and protected forest categories are called 'un-classed forests'. Reserved forests account for nearly 55 percent, protected forests for 28 percent and 'un-classed forests' for 17 percent of the total forest area in the country (FSI, 2011).
- ³ The exact extent of territorial forests needs to be carefully worked out as it has some functional overlap with protected areas, area under JFM and CCAs.
- ⁴ 'Forest type' is defined on the basis of broad physiognomic and structural characteristics (the net result of interaction and influence of climate, soil and past interventions) and topographical features (e.g. altitude and slope gradients). Knowledge of forest type is critical in selecting or applying appropriate management modules for sustainable forest management (MoEF, 2007).
- ⁵ About 50 percent of the plantations in India raised since 1980, are in agroforestry systems (FAO, 2009).
- ⁶ NRA is a revaluation of the national income accounts, adjusting for the values of natural resources used in various economic activities during the past fiscal year. The changes in both 'stock' and 'flow' of forests need to be accounted for (NFC, 2006).
- ⁷ 'Forest-dwelling Scheduled Tribes' are defined as members of the community of Scheduled Tribes who primarily reside in and depend on forests and forest land for livelihood needs and include Scheduled Tribe pastoral communities. 'Other traditional forest dwellers' are defined as those who have been living for at least three generations, or 75 years, prior to 13 December 2005 (Gol, 2006, Section 2(c) and 2(o)).
- ⁸ An adviser to the court on some matter of law who is not a party to the case.
- ⁹ Forest Stewardship Council Certificate Database. (Available from www.info.fsc.org. Accessed 16 September 2012).
- ¹⁰ Available from <http://www.icfre.org/index.php?linkid=left8311&link=1>. Accessed 12 September 2012.

Joint Forest Management – Co-management of Biodiversity

6

As of now, around 30 percent of the total forest area in India is managed under Joint Forest Management (JFM). The JFM approach enables effective conservation of forest resources and ensures that conservation gains are shared between the State and local communities. At present there are 1,18,213 JFM Committees across India, managing around 22.94 million hectares of forests. As a governance model, JFM has undergone several changes since it was first introduced in the 1990s. Co-management institutions created under JFM are now poised to integrate with local governance institutions. This move will lead to a more effective forest governance strategy that takes into account sustainability of conservation efforts as well as equitable sharing of benefits accruing from forests.



Introduction

The National Forest Policy, 1988 was a watershed moment in providing a new outlook on forest governance in India. At a fundamental level, it shifted the focus of forest management from commercial considerations to conservation of resources and meeting the livelihood aspirations of forest-dependent communities. There were several reasons behind this policy shift. First, notwithstanding some of the stringent centralized approaches to forest governance, the degradation of forest resources had continued unabated and conservation remained a challenge. There was also a widespread realization that attempts to conserve and manage forests through 'people exclusive' State control measures may not always yield desired conservation outcomes. As a result, the importance of forging partnerships with local communities both as beneficiaries and agents of conservation became apparent. Second, the idea that unlocking the economic potential of forests would aid inclusive growth and help alleviate poverty, particularly in the remote and far-flung areas of the country, also found traction. Third, a

few successful examples of community involvement in restocking degraded forests had started to emerge and this gave an impetus to 'people inclusive' conservation approaches (see Box 6.1). This strategy got official recognition when the Indian Planning Commission and MoEF started championing the cause of participatory forest governance in the early 1990s.

Territorial forest governance, described in the previous chapter, is a model of a single State agency managing a common property resource. Joint Forest Management (JFM), on the other hand, is a co-management model involving both a State agency (Forest Department) and the community. It recognizes the diverse, dynamic and complex nature of forest governance that is very relevant in the contemporary ecological, economic and political contexts of the country. This is the main distinction between these two governance models. Joint Forest Management: 1) institutionalizes community participation, whereas territorial forestry is top-down; 2) formalizes a system of benefit sharing with communities (e.g. from medicinal plants, NTFPs, fuel wood, fodder, timber etc.), whereas territorial forestry focuses mostly on generating revenue for the State;

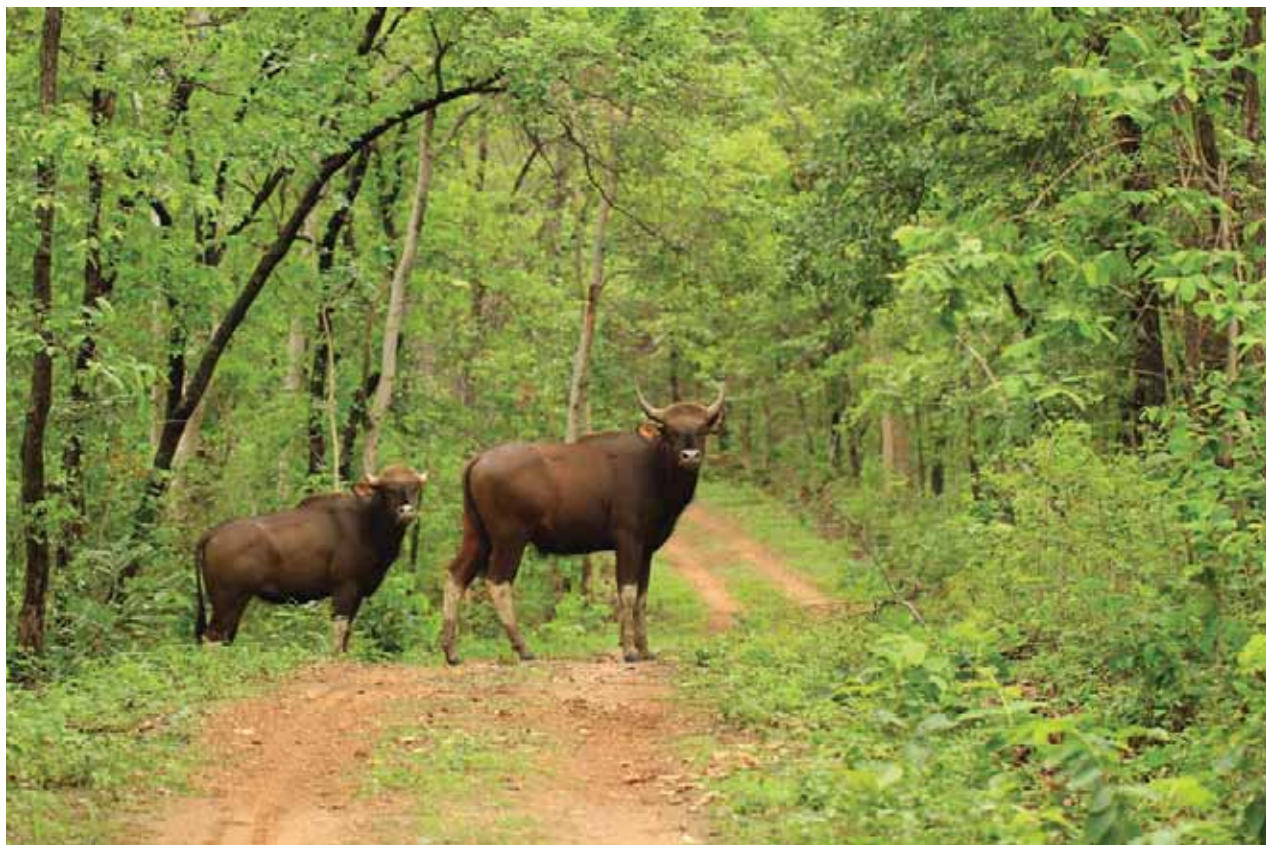


Photo: Manoj Nair

BOX 6.1: Arabari: the trend setter

During the 1970s, a few forest officials in Arabari, Midnapur District in West Bengal understood the criticality of community participation in the management of Sal (*Shorea robusta*) forests. They sought support of the local community in managing these forests and promised to address their livelihood concerns in return. This led to the formation of a Forest Protection Committee and around 1,272 hectares of highly degraded forests were regenerated and protected. In lieu of this, the community was given exclusive rights to NTFPs and also received employment opportunities. Further, their immediate requirements of fuel and fodder were also taken care of. Based on the success of this experiment, in 1989 the West Bengal Forest Department issued the first government order to involve village communities in forest protection, with a provision to give 25 percent of the revenue earned on timber harvested from co-managed forests to local communities.

Source: MoEF, 2002.

and 3) has a broader scope for biodiversity conservation and livelihood generation for communities. Through JFM, communities gain voice in decision-making about resource management, and a clear *quid pro quo* is established between their management efforts and the benefits they receive. While territorial forest governance was a product of the 1894 and 1952 Forest Policies, JFM was inspired by the National Forest Policy of 1988.

Even though JFM began as an offshoot of territorial forest governance, it gradually acquired a distinct character. JFM operates in territorial forests and protected areas. Functionally, however, it can be considered as a transition between territorial forest governance and community forestry. It is also a meeting point between State-owned and community-owned forest resource regimes.

This chapter aims to trace the evolution of JFM, its essential features, scale and spread, institutional framework, effectiveness, benefit-sharing mechanisms, challenges faced by it, and suggests the way ahead.



Photo: Foundation for Ecological Security

The evolution of JFM in India

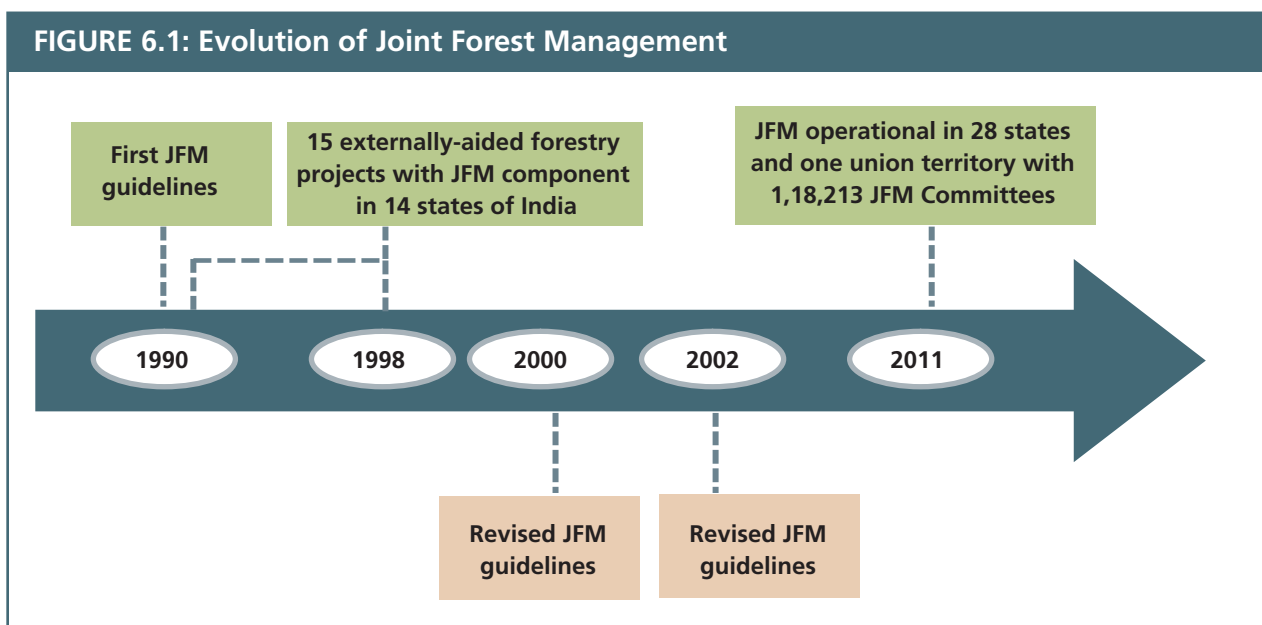
A phase of forest governance, characterized by large-scale timber extraction and establishment of commercial tree plantations, began in India in the colonial period and continued well into the late 1980s. At several places, this approach also resulted in restricting the access and curtailing the rights of communities over forest resources.

Over the years, pressure on forests, primarily for land, increased many fold. Forest resources got sandwiched between conflicting land-use claims such as demands for infrastructure development projects (e.g. roads, irrigation and mines) and the growing needs of people. This led to declining productivity and degradation of forests. Drivers of forest degradation also included proliferation of invasive alien species, removal of forest biomass, excessive grazing,¹ continued incidence of forest fires and relatively low investments in eco-restoration.

A precursor to co-management of forests in India was 'social forestry'. The National Commission on Agriculture (1976) had recommended that government-owned forests be used for revenue generation through high-value production forestry, while people's needs be met from plantations outside forest areas.

Social forestry initiatives were limited to raising tree plantations without any formal institutional partnership and reciprocal commitments with people. The focus of social forestry programmes was largely on barren or waste lands lying outside State-controlled forests. Multilateral and bilateral agencies like the World Bank and Swedish International Development Cooperation Agency (SIDA) had also extended financial support to social forestry programmes in different states. Between 1980 and 1991, there were 12 externally-funded social forestry programmes in 14 Indian states with a budget of US \$906.76 million (NFC, 2006). The experience of social forestry along with the lessons drawn from the experiments in the co-management of forests in areas like Arabari in West Bengal and Sukhomajri in Haryana influenced the formulation of the National Forest Policy of 1988 and the national guidelines for JFM in 1990.

Breaking away from the hitherto State-centric approach of forest governance, the 1988 National Forest Policy accorded primacy to biodiversity conservation, sustainable management of forest resources and meeting the subsistence needs of the people. The policy also envisioned creation of a massive people's movement for protection and conservation of natural resources, particularly the involvement of women for achieving these objectives. The ground was cleared for the emergence of an era of participatory forest governance in India (see Figure 6.1).



Essential features of JFM

The JFM guidelines of 1990 underlined the need for community involvement in the protection and management of forests and providing tangible benefits to them on *quid pro quo* basis (see Box 6.2). The national JFM guidelines were quite broad-based and provided flexibility to individual states to incorporate local concerns and specificities (see Boxes 6.2 and 6.3).



Photo: Foundation for Ecological Security

BOX 6.2: Salient features of JFM guidelines

The JFM guidelines of 1990 envisage people's involvement in the development and protection of forests by according priority to their requirements of fuel wood, fodder and small timber. Salient features of the 1990 JFM guidelines include:

- Involvement of NGOs/voluntary agencies as interface between state Forest Departments and local village communities.
- Access of people, who are organized into village institutions (mostly Village Forest Committees), to forest land and to usufructs from forests like NTFPs (grasses, lops and tops of branches etc.) and a share of proceeds from the sale of trees on maturity to the community.
- Preparation of a ten-year plan for development and management of forests under JFM, in consultation with communities. This would include mechanisms for protection and operations like inducement of natural regeneration of existing rootstock, seeding and gap filling and whenever necessary, intensive planting, soil-moisture conservation measures, fire protection, maintenance of boundaries, weeding, tending, cleaning and thinning.
- Plantation of saplings of species useful to communities like fruit trees, fuel wood and fodder trees.
- Prohibition of grazing in forests protected by the village community and harvesting of grass from the protected forests (free of cost) for stall feeding.

Guidelines issued in 2000 and 2002 say that:

- Joint Forest Management should cover both the degraded as well as good forests (except those falling within the protected area network) with a crown density above 40 percent.
- All adults of the village are eligible to become members of the JFM Committee (JFMC).
- At least 50 percent members of the JFM General Body (GB) should be women. For the GB meeting, the presence of at least 50 percent women members is a prerequisite. At least 33 percent of the membership in the JFM Executive Committee/ Management Committee should be filled by women members. At least, one of the office bearers i.e. President, Vice-President or Secretary should be a woman member of the Committee.
- For the long-term sustainability of resources, it is essential that not less than 25 percent of the revenue earned from the final harvest, where tree felling occurs, should form the share of the village community and be deposited in the village development fund for meeting the conservation and development needs of the forests. A matching contribution may be made by the Forest Department from its share of harvest proceeds.

Source: Guidelines for strengthening of Joint Forest Management Programme, circular no. No.22-8/2000-JFM (FPD) dated 21 February 2000 and 24 December 2002.²

Box 6.3: Diverse approaches to JFM in India

In most states, JFMCs are registered with the state Forest Departments; whereas in Haryana these are registered under the Societies Registration Act 1860 and in Gujarat, as cooperatives. In Karnataka Village Forest Committees are constituted under the Karnataka Forest Act. In Uttar Pradesh, JFMCs have been recognized as Forest Officers for the Village Forests under Section 28 of the Indian Forest Act, 1927. Many state JFM resolutions have Panchayat (local governance bodies) members as *ex-officio* members of JFMCs. In most cases, the Secretary of the JFMC is a Forest Department official (Forester or Forest Guard) and the Chairperson is a villager.



Photo: Foundation for Ecological Security

Source: Various state government orders.

Nonetheless, the principle of community participation remains central to the programme. Both central as well as state governments have periodically issued orders and guidelines to further strengthen JFM. The institutional structure of the JFM programme at the grassroots level is given in Figure 6.2.

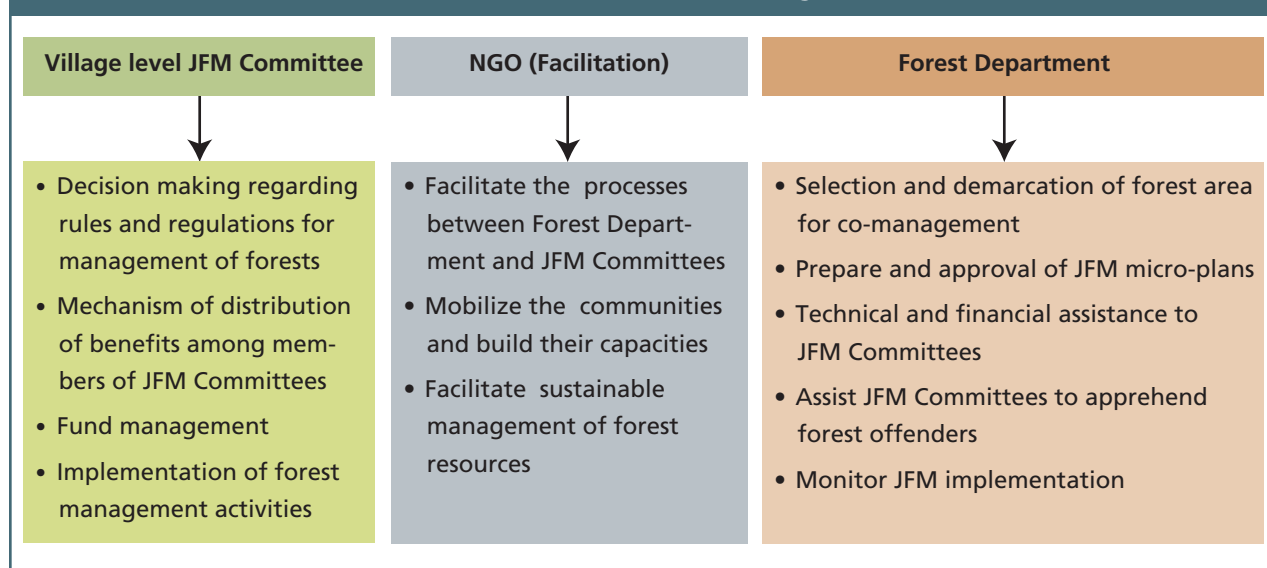
Scale of JFM in India

Joint Forest Management in India evolved through specific contexts and situations prevailing in different parts of the country. While West Bengal, Haryana and Odisha have completed two decades of JFM, others like Assam, Sikkim and Mizoram (that issued orders in 1998) are yet to fully implement the measures.

Donor-assisted projects have played a major role in the spread of JFM in the country. By 1998, there were 15 externally-aided forestry projects in 14 states of India that had a JFM component (Planning Commission, 2001). These projects were mainly funded by the World Bank, Japan Bank for International Cooperation,³ Department for International Development of UK, Swedish International Development Cooperation Agency (SIDA), European Economic Community and UNDP.

Lately, MoEF's National Afforestation Programme (NAP) has become the flagship programme for JFM in the country. In order to give a fillip to JFM, a component, 'Strengthening of Joint Forest Management' was added to NAP in 2004, with a view to constituting JFMCs in all 1,73,000 forest fringe villages in the country and working these forests through participatory management towards the dual objectives of biodiversity conservation and generating livelihoods. Joint Forest Management as an approach has now been adopted by

FIGURE 6.2: Institutional structure of Joint Forest Management



all the states of India and 1,18,213 JFMCs in 28 states and one union territory are managing around 22.94 million hectares of forests, which is around 30 percent of the total forest area of India (Singh *et al.*, 2011) (see Figure 6.3). In other words, roughly one-third of the area under the state Forest Departments is now being managed in partnership with local communities.

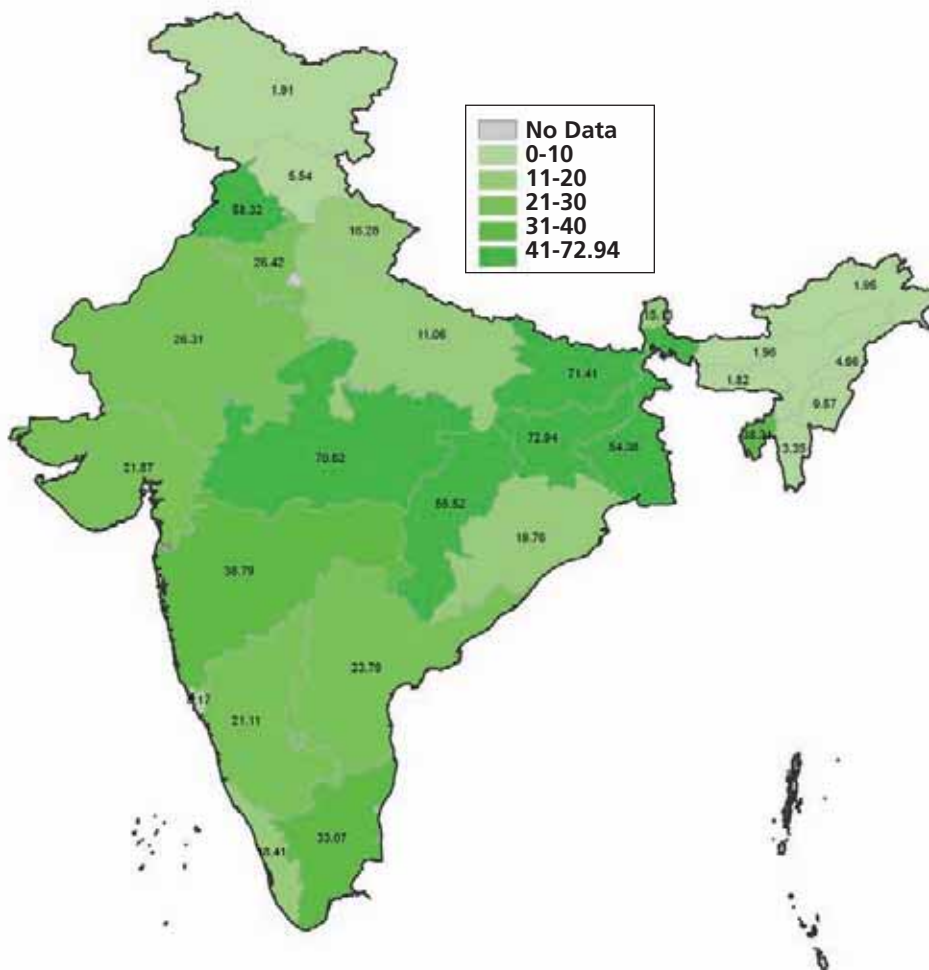
At the national level, the average area of forests per JFMC is about 194 hectares and more than 14.5 million families are now partners in forest management. Four states in the country, i.e. Andhra Pradesh, Chhattisgarh, Madhya Pradesh and Maharashtra, account for two-thirds of the area covered under JFM and 39 percent of all JFMCs. Also, tribal households account for one-third of all households participating in JFM in the country (*ibid.*).

Institutional framework and decision making

Joint Forest Management Committee

Joint Forest Management Committees are village-level institutions established based on state government's adaptation of the JFM guidelines issued by the central government. JFMCs enter into formal partnerships with the Forest Department on forest protection and management. They frame rules for the effective management of the earmarked forests, determine rights of collection, sale of sustainably harvested usufructs, and distribution of benefits arising from management (see Box 6.4).

FIGURE 6.3: State-wise percentage of forest area covered under JFM



Source: Foundation for Ecological Security, based on Singh, *et al.*, 2011.

BOX 6.4: Sanyukta Van Vyavasthapan Samiti, Baripada village, Dhule district, Maharashtra

Indiscriminate use of natural resources between 1980 and 1990 had led to the near destruction of forests in Baripada village of Dhule district, Maharashtra. This had resulted in scarcity of drinking water, shortage of firewood and fodder, affected agriculture, reduced employment opportunities, and caused poverty and migration. In 1992, the villagers decided to protect about 445 hectares of forests abutting the village. With the support of the Forest Department, a JFMC was constituted. Two men were assigned the task of keeping vigil over the forests. All the households in the village contributed to the wages of the watchmen. Further, rules were framed for the management of the forests that included the following:

- For stolen timber hauled in bullock-cart, a fine of INR 1,001.
- For timber carried by person, a fine of INR 501.
- For cutting any green or live tree, a fine of INR 1,500.
- For any person or watchman reporting theft, or identifying or apprehending the smuggler, a prize of INR 51.
- For about 15 days in winter, all the villagers of Baripada would be allowed to take home dry wood to meet their yearly requirement of firewood with the proviso that only head loads were allowed.
- Only villagers of Baripada would bid in the auction of fruits and flowers of the forests.
- Villagers of Baripada would assist the Forest Department in different habitat improvement operations like digging trenches, land-bundling, and cutting / pruning of trees for better growth.
- For special occasions like marriages, funerals and gatherings, villagers would be allowed to collect dry wood.
- Grazing was not allowed in the forests, instead, grass harvested after the monsoon would be distributed to villagers to feed their livestock.

Though there was some initial resistance, the unity of the villagers was such that the resistance gradually gave way to cooperation. Within five years, the forests were regenerated. By 2007, the village earned about INR 2,00,000 from Mahua (*Madhuca latifolia*) trees (planted in their farms) and additionally about INR 50,000 from the auction held by the JFMC. Encouraged by the response of the people, the Forest Department undertook soil and moisture conservation operations in the forests. Gradually this improved the groundwater recharge and more land was brought under irrigated farming, leading to an increase in food production and crop diversification. With the revival of the forests, the availability of NTFPs increased and forest vegetables, medicinal plants, fruits and flowers became easily available. There was also an increase in wildlife, with sightings of animals like foxes and large felines becoming frequent.

Source: Nomination for GoI-UNDP India Biodiversity Awards, 2012.

Ecodevelopment committee

Joint Forest Management Committees function mostly in degraded forests/deforested areas lying outside protected areas. The counterpart of JFM in protected areas is the ecodevelopment programme that functions through Ecodevelopment Committees (EDCs). They are village institutions that partner with protected area managers for the protection, preservation and propagation of wildlife in protected areas. They benefit from sustainable, non-consumptive resource use opportunities (e.g. ecotourism) that compensate for the loss of access to resources inside protected areas.

Since 1991, the government has committed considerable funds for ecodevelopment in protected areas, particularly for integrated and site-specific measures to conserve biological diversity through sustainable economic development. In some areas, local communities have been able to leverage collateral funding for activities like agricultural development, soil and moisture conservation, income-generation activities and infrastructure improvement in the village. In several protected areas, EDCs have evolved into excellent 'social fences' for the conservation of biological resources and have started to benefit from the economic opportunities created (e.g. Periyar Tiger Reserve in Kerala, see Box 6.5).

BOX 6.5: Towards a green pilgrimage through people's collaboration

Periyar Tiger Reserve is one of the finest Tiger Reserves in India. Predominantly a tropical evergreen forest, it has unique biodiversity attributes, a high degree of endemism and aesthetic value. The rainforests of Periyar are the catchment of three major rivers in the state of Kerala, viz., Azhutha, Pamba and Periyar. The Sabarimala temple (an important pilgrimage shrine) is situated deep inside the forests of Periyar and is visited by more than 10 million devotees every year. Access to the shrine is through three arduous trek paths winding up through the forests. The heavy influx of pilgrims used to cause widespread littering of plastic and other wastes, clearing of forests for erecting shelters, large-scale collection of firewood and thatching materials, felling of trees, smuggling of valuable timber, poaching, illicit brewing, and extensive forest fire.



Photo: Periyar Foundation

The Forest Department had found it difficult to address these problems till the formation of EDCs in early 2000. These EDCs consisted of local villagers living in and around the temple. They were entrusted with providing basic amenities to pilgrims, in the process earning their livelihoods. To coordinate their operation, a confederation of EDCs was formed. Participatory rules and regulations were formulated taking into account environmental and social parameters. They promoted the use of liquefied petroleum gas (LPG) and non-jungle firewood brought from outside as fuel. It is estimated that this step alone saved around 200,000 trees annually and resulted in 70 percent reduction in fuel wood collection from the forests. Ecodevelopment Committees have also been actively involved in the protection of forests and restoration of degraded forests. The partnership was instrumental in creating a green pilgrimage paradigm in the region as well as providing valuable livelihood opportunities to people.

Source: Nomination for Gol-UNDP India Biodiversity Awards, 2012.

Forest Development Agencies

While JFM started as a village level initiative (with JFMCs/EDCs functioning as basic units of community-based management), there was a felt need to federate them into an umbrella organization for more effective coordination. This led to formation of Forest Development Agencies (FDAs) under the National Afforestation Programme (NAP) in 2002.

The FDA is a federation of all JFMCs/EDCs at the forest division level and is registered under relevant legislation (e.g. Societies Registration Act). An FDA may include up to 55 JFMCs. This institutional structure facilitates coordination among various JFMCs/EDCs operating in adjoining areas and helps individual JFMCs/EDCs in micro-planning, organizing training and awareness

programmes and implementation of larger programmes and activities. The Forest Development Agency also facilitates JFMCs/EDCs in formulating guidelines for utilization and sharing of usufructs, technological improvement and coordinating and monitoring the activities of their constituent JFMCs/EDCs. It has in fact, contributed significantly to strengthening individual JFMCs/EDCs and improving their bargaining, convening and/or organizational capacities.

Forest Development Agencies and JFMCs/EDCs together coordinate with government departments to dovetail their schemes and programmes regarding afforestation or conservation in a holistic manner. Forest Development Agencies and JFMCs have also developed partnerships with the private sector and other organizations working on rural livelihoods.

Effectiveness of JFM

The effectiveness of JFM is to be judged from: 1) its direct and indirect impact on maintaining or enhancing biodiversity; 2) sustainable use of biodiversity to meet people's needs; and 3) the level of equity in sharing of benefits between the State and the community, and within the community.

Biodiversity conservation and sustainable use

Over the years, JFM has yielded substantial ecological gains as well as improvements to rural livelihoods. Large areas of degraded forests were regenerated through successful protection and tending. Besides the direct biodiversity impact that regeneration provides, it also eases pressure on well-stocked forests. A few examples of improved biodiversity conservation are:

Regeneration of biomass: In Andhra Pradesh, Madhya Pradesh, Odisha and West Bengal, JFM had a positive impact in regeneration (TERI, 1999). Studies on the impact of JFM on vegetation indicate that a longer period of protection enhances regeneration and tree species diversity (Ravindranath *et al.*, 2000). Excellent pole crops of Sal (*Shorea robusta*) in Odisha and West Bengal are testimony to the successful rehabilitation of degraded forests under JFM (NFC, 2006).

Species regeneration: A study of JFM in two forest ranges in Chhattisgarh showed positive results in species regeneration. The species conservation value in both the sites showed an exponential increase in the first year and continued to grow in the second year. It stabilised and improved in the third year after a short period (Mukhopadhyay *et al.*, 2012).

Additional afforestation measures: In Uttara Kannada district of Karnataka, 12,050 hectares of plantations have been raised on degraded forests till 1999 under JFM. This accounts for 1.5 percent of the total forests and 28 percent of the open forests in the district (Bhat *et al.*, 2000).

Maintenance or enhancement of biodiversity: Studies indicate that in many plantations under JFM, biodiversity has improved, due to protection offered to the plantations in initial years (Bhat *et al.*, 2001).

The co-management model has demonstrated conservation benefits in protected areas as well. The GEF-World Bank India Eco-development Project (1996-2004) supported the development of EDCs in seven protected areas of the country. Its three primary objectives were to: 1) improve the capacity of protected area management to conserve biodiversity and increase opportunities for local participation in protected area management activities and decisions; 2) reduce negative effects of local people on biodiversity and *vice versa*; and 3) develop more effective and extensive support for

Photo: Foundation for Ecological Security



ecodevelopment. A recent review documented salutary impacts of the Project, albeit with the caveat that these are anecdotal findings and observations that need deeper study (Box 6.6).

Destructive NTFP harvesting practices fetch quick returns for collectors, but are among the major drivers of forest degradation. Efforts are being made to promote sustainable harvesting of NTFPs in some JFM sites by adequately sensitizing NTFP collectors (see Box 6.7).

Benefit-sharing mechanisms

The earlier centralized forest governance model, barring a few cases, had no systematic arrangement for sharing of forest products with local communities. This changed with the advent of JFM. Most of the states now allow a 100 percent share of usufructs (NTFPs, fuel wood, fodder medicinal plants and small timber except nationalized/reserved items) to communities from the co-managed forests. Further, NTFPs (except a few nationalized products) are available to local communities free of royalty. Joint Forest Management Committees are also entitled to a sizeable share in profits from commercial timber harvested in their area of operation (see Box 6.8). This arrangement of benefit sharing with local communities has significant impact on the rural economy.

BOX 6.7: Non-destructive harvesting of NTFP

Under the People's Protected Area initiative of JFM in select forest divisions of Chhattisgarh, villagers have been sensitised on non-destructive harvesting:

- In the case of rhizome species of Tikhur (*Curcuma angustifolia*), Keokand (*Costus speciosus*) and Baichandi (*Dioscorea hispida*), they are given the option of choosing one out of three tubers, so that regeneration is taken care of. Though uprooting of a whole tuber of Tikhur is easier than leaving 25 percent in the ground, repeated practice of collecting 75 percent of the tuber, has increased the regeneration and its sustained availability.
- New rituals like *Aonla Navmi* have been developed and villagers have been sensitized to harvest Aonla (*Emblia officinalis*) only after *Aonla Navmi*. They have been educated to leave some fruits in the plants for regeneration. Mature fruits also fetch a better price.

Through non-destructive harvesting, there has been greater regeneration of NTFPs like Kalmegh (*Andrographis paniculata*) and Aonla in the forest. As a result, people are getting more NTFPs and better prices for them. People have also stopped felling Achar (*Buchanania latifolia*) and Aonla trees.

Source: Mukhopadhyay *et al.*, 2012.

BOX 6.6: Biodiversity benefits of co-management in protected areas

A review of the correlation and causal relationship between protected area management effectiveness and biodiversity outcomes and impacts in Periyar (Kerala) and Pench (Madhya Pradesh) Tiger Reserves in 2012 observed benefits of the co-management approach piloted by the GEF-World Bank India Eco-development Project (1996-2004). It observed a steady increase in species between early and late 2000s in Periyar (tiger and elephant) and in Pench (tiger, leopard, spotted deer, sambar deer and gaur) Tiger Reserves. In Periyar, canopy cover was observed to have remained stable between 2000 and 2010. Ecodevelopment Committee members, drawn from local communities surrounding the protected areas, were observed to have stopped engaging in extractive activities that were negatively impacting biodiversity and instead were engaging in biodiversity-friendly activities supportive of protected area management. They had voluntarily reduced their dependence on forest resources with consequent reduction of household income flows, and had a high interest in income from sharing of tourism benefits and employment in the Reserve. Protected area staff had engaged EDCs as champions of the protected area. All these functions of EDCs had resulted in their functioning as 'social fences' that serve to protect biodiversity through their social commitment to the conservation goals of the protected areas. The engagement of EDCs by park management thus reduced a driver of biodiversity loss and reduced management costs over time.

Source: Zimsky *et al.*, 2012.

BOX 6.8: Benefit sharing between JFMCs and Forest Departments in select states

State	Benefit-sharing arrangements according to the state guidelines
Chhattisgarh	JFMC is given 15 percent of the total value of timber/bamboo obtained from the final felling in the coup falling within the jurisdiction of the Committee.
Haryana	Net income made from the sale of <i>Bhabbar</i> grass is divided between the government and JFMC in the ratio of 25:75.
Jammu and Kashmir	The members are entitled to get a share of 25 percent of the net proceeds from the first major harvest of the plantation and also collect grass, fodder, dry and fallen wood etc. free of cost.
Karnataka	The community is entitled to 90 percent of the produce obtained from the JFM area.
Madhya Pradesh	10 percent of the net income from the timber harvest and 20 percent from bamboo harvest go to the Forest Protection Committees that protect well-stocked forests after deducting actual expenses. Village Forest Committees that protect degraded forests are entitled to 100 percent of the value of forest produce from the rehabilitated forest, after deduction of harvesting cost.

Source: Singh *et al.*, 2011.

Though the initial thrust of JFM in India was to restock degraded forests, the community-based model of NTFP collection emerged as a far more sustainable and beneficial model. At present, JFM not only contributes to the regeneration of degraded forests, but also helps in the effective conservation of well-stocked forests, apart from meeting the community's subsistence needs. It is estimated that the total income from commercial timber, bamboo and NTFPs from the improved forests under JFM will have a value of around US \$2 billion in 2020 (World Bank, 2006).

It is estimated that each JFMC has benefited by approximately INR 250,000 and each participating household by INR 1,944 annually from JFM (Singh *et al.*, 2011). In 15 states alone an annual benefit of INR 19,280 million accrued to the beneficiaries, mostly marginalized sections of society (*ibid.*). A recent study in West Bengal found that income inequality in JFM households was reduced by 12 percent (due to the additional benefits from forest-derived income under the JFM programme) as compared to non-JFM households. The study also found a major increase in per capita real income from

Photo: Foundation for Ecological Security



forest resources for all categories of JFM villages. The rate of increase in forest income was particularly high among landless and marginal landholding households (Das and Sarker, 2008).

Gender and JFM

Women have a very close and intimate relationship with forests around the world. In India, it is mainly women who collect fuel wood, fodder and other NTFPs from forest areas. Two of the main cash-earning NTFPs, Sal (*Shorea robusta*) seeds and Tendu (*Diospyros melanoxylon*) leaves, are collected primarily by women. Recognising this organic relationship, JFM guidelines issued in 2000 prescribe that women should constitute at least 50 percent of the membership of the JFM General Body and 33 percent of the JFM Executive Committee. A woman must hold at least one post – of President, Vice-president or Secretary. The stipulated quorum for holding Executive/Management Committee meetings is presence of one-third of women executive members or a minimum of one. In the Executive body, the 15 nominees to JFMCs have to include a minimum of seven women members.

Micro-plans: planning for sustainability

Unlike the earlier top-down approach of forest governance, JFM is based on a participatory approach that requires extensive interaction and intensive consultation among local communities, the Forest Department and other stakeholders. The prerequisite for such a partnership (particularly with respect to planning and execution) is mutual trust and understanding between the partners and appreciation of each other's perspectives.

The JFMCs'/EDCs' functioning is based on micro-plans, which are prepared through a participatory process that specifies the objectives, regulations, commitments, benefit-sharing, rights and conflict-resolution mechanisms. Micro-plans are also dovetailed with the working plan of the forest division. Micro-planning focuses on people's priorities and includes both land and non-land based investment and development. It also requires negotiation of objectives and activities among different groups within the village community and/or between the community and the Forest Department. Some rules for micro-planning are given in Box 6.9.

BOX 6.9: Rules for preparation of micro-plans by JFMCs

- The micro-plan has to be prepared and endorsed by the JFMC's General Body.
- Forest Department officials and NGOs must provide support for the preparation of micro-plans.
- Representatives of Panchayati Raj Institutions (PRIs) should be actively involved.
- The micro-planning process should involve capacity building of villagers, particularly of marginalized groups, to enable them to play a meaningful role in articulating their views and concerns.
- Micro-plans must take into account sustainability concerns – environmental, institutional, social and financial. In other words, they should consider whether: (a) proposed interventions will benefit the natural environment or harm it; (b) villagers have the institutional capacity to sustain physical structures; (c) the interventions are in harmony with and build on the existing social fabric of the community; and (d) livelihood activities to be supported are likely to be profitable.
- The micro-plan should show who will benefit from the proposed intervention and explain the sequencing or prioritization of interventions made by the community.
- The micro-plan should make a special effort to benefit socially and economically marginalized groups, such as poor women (especially female-headed households), shifting cultivators and the landless.
- A copy of the approved micro-plan document, written in the local language, should be kept with the JFMC.
- Micro-planning should be an iterative and flexible process; facilitators should enable the JFMC and Forest Department to review and revise the micro-plans at least once a year, especially with the involvement of vulnerable groups/ members of society.

Source: Micro-planning guidelines of Tripura Forestry Environment Improvement and Poverty Alleviation Project.

Ensuring effectiveness: monitoring of JFM

Today, JFM has emerged as the most important forest management programme in the country. The scale and importance of the programme demands regular monitoring so that the policies continuously respond to the emerging challenges. A large number of stakeholders including various state governments, NGOs, communities and experts are periodically consulted for improving policies in a timely manner.

In 1998, MoEF created a separate JFM Monitoring Cell. A notification was also issued by MoEF in 2000 for the creation of a multi-stakeholder JFM Network (JFMN) at the national level, consisting of representatives of stakeholders such as the state Forest Departments, NGOs, donor agencies, research organizations and training institutions. At present, monitoring of JFM/

NAP among different stakeholders including community members is undertaken at the National Afforestation and Eco-development Board meetings chaired by the MoEF.

Despite its existence over the last two decades, studies on the impact of JFM on biodiversity conservation are limited. Further, in a situation where rural communities are heavily dependent on forest products, there has been surprisingly little study of the impact of various management practices on the floral and faunal diversity of JFM forests (Shahabuddin, 2010).

The sparse scientific literature available is riddled with problems associated with inadequate experimental design, and interpretation of data. In the absence of systematically collected data, few concrete strategies can be derived for long-term forest management with specific goals (*ibid.*).



Photo: Foundation for Ecological Security

Challenges and way forward

The JFM model has had a significant impact on forest governance in India. To a great extent it has enhanced protection of forests and conserved biodiversity, improved the relationship between the Forest Department and local communities, restocked degraded forests, contributed to conservation of well-stocked forests, and increased the availability of firewood and NTFPs. Provision for sharing of usufructs (including a share in the timber proceeds) has also added to the income of local communities. Most importantly, JFM also acts as a platform for people's mobilization. Despite all this, JFM faces several challenges.

It is argued that in most of the states, the programme has been extremely dependent on government funding, giving rise to serious questions about its sustainability (Nayak, 2002). Another major challenge is the institutional sustainability of JFMCs. The question of sustainability

acquires significance in view of the functional overlap between JFMCs and Panchayati Raj Institutions (PRIs). While PRIs in India are a constitutionally empowered system of local governance, JFM is not supported by any specific legislation and is run as a programme under the executive orders of the government. For the long-term sustainability of JFMCs, it is imperative to establish formal linkages with PRIs. Some states have taken initiatives towards this. For instance, in Maharashtra, all JFMCs have been brought under the ambit of Gram Panchayats and JFMCs now operate as committees of Gram Panchayats.

The situation has been further complicated by the passing of the Forest Rights Act. The Act gives rights and responsibilities to the Gram Sabha (village assembly) for sustainable use, conservation of biodiversity and wildlife (see Chapter 7 for details). Prior to this Act, JFMCs were responsible for these functions. The challenge now is to resolve this jurisdictional overlap.



Photo: International Fund for Agricultural Development

On a broader scale, JFM needs to address the requirements and priorities of women and other marginalized sections of society in a more prominent manner. There is also a need to achieve synergy between traditional community forest management and JFM programmes at the local level.⁴ Further, systematic ecological studies need to be undertaken at

the national or state level to understand the impact of JFM on forests with respect to regeneration, biodiversity conservation and biomass accumulation. The JFM monitoring mechanism also needs to be significantly strengthened to monitor and record forest changes and further support the transition to community-based forestry.

Endnotes

¹ India raises 15 percent of the world's livestock population on 1.5 percent of the world's forest and pasture lands (Anita Chaudhury, *Initiation of Land Use Policy in India*, Department of Land Resources, Ministry of Rural Development, Government of India, 19 May 2011, New Delhi (Available from: <http://www.hrdp-net.in/live/hrdpmp/hrdpmaster/hrdp-asem/content/e48335/e48799/e48940/e48800/eventReport48932/InitiationofLandUsePolicy-19.511.pdf>. Accessed 3 September 2011).

² Available from [http://www.iifm.ac.in/databank/jfm/jfmccl.html#jfm cell](http://www.iifm.ac.in/databank/jfm/jfmccl.html#jfm%20cell). Accessed 6 September 2012.

³ Now Japan International Cooperation Agency.

⁴ In Odisha, for instance, some 4,000 to 5,000 villages have been collectively demanding replacement of JFM with a Community Forest Management policy, which acknowledges and builds upon community initiatives (Singh, N.M., 2000). Similarly in Madhya Pradesh, tribal organizations argue that meaningful community participation in forest management should include land reforms and resolving people's rights to community resources.

Decentralized Governance of Biodiversity

7

Efficient, equitable and sustainable management of natural resources requires that governance be decentralized to the lowest possible level. Almost two decades ago, India embarked on an ambitious programme of decentralized governance by devolving functions, functionaries and finance to village local self-government institutions. This was quickly followed by legislation for self-rule by tribal communities in accordance with their traditions and customs. The management of biodiversity has been enabled by another specific law. Community-based natural resource management has received further support from yet another law that recognizes the rights of communities to manage forests and other common property resources. The initiation of decentralized governance processes has opened up a plethora of possibilities for making biodiversity management in India more grounded, efficient and responsive to ecology and livelihoods.



Introduction

'Decentralization' of governance refers to the process of transferring decision-making powers to lower, more localized levels. There are several different trajectories of decentralization of governance over natural resources in India (Lele, 2004). This chapter examines political decentralization over biodiversity – the transfer of decision-making power to lower-level government units or to citizens or their elected representatives (Cohen and Petersen, 1997).

There are four overarching central laws under which governance over natural resources has been devolved: (i) the 73rd Amendment to the Indian Constitution in 1992 (ii) the Panchayats (Extension to the Scheduled Areas) Act, 1996 (PESA) (iii) the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 and (iv) the Biological Diversity Act, 2002. The first two are examples of devolution – authority transferred by central government to local-level governmental units holding corporate status

guaranteed under state legislation (*ibid.*). The third and fourth are examples of transfer of decision-making power to local communities.

Political decentralization 'from above' has not been the only trajectory of decentralization over natural resources. Some unique legal provisions in states recognising decentralized authority over natural resources are the legacy of the conditions under which these states acceded to the Indian Union and of precolonial laws (provisions in the North East states and Van Panchayats in Uttarakhand, for instance). Some post-colonial laws have formalized pre-existing decentralized arrangements (as in the case of Gramya Jungles in Odisha) and have also proposed new localized decentralized arrangements (Community Reserves under the Wildlife Protection Act, 1972, for example).

This chapter examines each of these models of decentralized governance of biodiversity resources, providing an idea of how they evolved, how they work, the scale at which they operate and the challenges they face.



Panchayati Raj Institutions and governance of natural resources

The idea of 'Panchayats' or village local self-government was advocated by Mahatma Gandhi during India's independence movement. Panchayats found mention in the Directive Principles of the Indian Constitution, where states are enjoined to set up Panchayats and provide them with requisite power and authority to function as units of self-government at the grassroots level. However, as an effective governance institution, Panchayati Raj Institutions (PRIs) acquired a renewed identity after the 73rd Constitutional Amendment in 1992.¹ One-third of the elected membership of PRIs is reserved for Scheduled Castes and Scheduled Tribes² and women, thus enabling representation of the most disadvantaged sections of society.

The Amendment provided a list of 29 subjects over which PRIs are conferred powers by devolution, of which 11 are

BOX 7.1: Subjects related to natural resources over which Panchayati Raj Institutions have powers

- Agriculture, including agricultural extension
- Land improvement, implementation of land reforms, land consolidation and soil conservation
- Minor irrigation, water management and watershed development
- Animal husbandry, dairying and poultry
- Fisheries
- Social forestry and farm forestry
- Minor forest produce
- Drinking water
- Fuel and fodder
- Non-conventional energy sources
- Maintenance of community assets

Source: Gol, 1992.

related to natural resources (see Box 7.1). States and union territories in India thereafter passed laws empowering PRIs in conformity with the 73rd Amendment.



Panchayati Raj Institutions in Scheduled Areas

The Scheduled Areas have a preponderance of tribal population and the Constitution provides for separate laws for the administration of these areas. Two categories of Scheduled Areas exist in India – Schedule V Areas or Scheduled Areas found in nine states of central, western, eastern and southern India, and Schedule VI Areas or Tribal Areas in five states in North East India. The 73rd Constitutional Amendment was not automatically applicable to these areas. Instead, a new Act, the Panchayats (Extension to the Scheduled Areas) Act, 1996, applicable to Schedule V Areas, was passed, making a number of modifications to the 73rd Amendment.

The PESA Act, as it has come to be known, defined local self-governance for communities living in Scheduled Areas and recognised their traditional rights over natural resources. A village in the Scheduled Areas was defined as consisting of a habitation or a group of habitations or a hamlet or a group of hamlets, comprising a community

and managing its affairs in accordance with traditions and customs. PESA recognises the Gram Sabha or village assembly as the basic unit of governance (ELDF, 2004).

PESA empowers the village community to plan village development, manage natural resources and resolve conflicts in accordance with traditional customs and practices (*ibid.*). The powers and rights conferred on the Gram Sabha that are relevant to the management of biodiversity include: ownership of minor forest produce, prevention of land alienation, planning and management of minor water bodies, the right to be consulted before acquisition of land for development projects and before resettling or rehabilitating persons affected by such projects, and mandatory recommendation before the granting of prospecting licences or mining leases for minor minerals.

Success stories of natural resource management by Panchayats

Devolution of management of natural resources has led to several cases of successful management of natural resources with positive results for biodiversity conservation by PRIs. For example, in Maharashtra and Rajasthan, Panchayats have demonstrated successful models of land management (Box 7.2).



Photo: Foundation for Ecological Security

BOX 7.2: Land management by Panchayats

Hivre Bazar Panchayat in Ahmednagar district, Maharashtra, has full control over the wasteland and forest land in its jurisdiction and has brought the entire area under watershed management and afforestation. It has introduced incentives for protection of trees and soil moisture conservation.

Gopalpura Panchayat in Churu district of Rajasthan has involved its residents in protection of common lands and forest lands. The Panchayat opposed the grant of mining leases on Panchayat and forest land to private entities and approached the High Court. It also prepared a land-use plan. Gopalpura Panchayat inspired people in villages of 20 Panchayats to unite and protect their common lands.

Source: Gol, 2009.

The Rajasthan Common Land Policy, 2010, laid down additional norms for devolution of management of common lands to Panchayats. A Standing Committee for natural resource and biodiversity management has been constituted at the Gram Panchayat level and a Grazing Land Development Committee at village/habitation level. The Policy envisages provision of 'a ready platform for other institutions such as Watershed Development Committees, Grazing Land Development Committees, Biodiversity Committees, Committees for management of minor irrigation tanks etc. to converge and strengthen local governance of natural resources.' Ward Sabhas³ are envisaged to 'identify community rights on the village common lands.' The Policy also provides for leasing of 'waste lands' to Panchayats and compensation in cases where pasture lands are used for other public purposes.

The state of Gujarat involves PRIs at all levels for the implementation of watershed projects. Members of PRIs are trained on watershed development and are involved in selecting beneficiaries, planning, implementing, spending funds and monitoring (TARU, 2011a). In West Bengal, funds for watershed development are routed through the Gram Panchayat. The head of the Gram Panchayat, the *Pradhan*, is a member of the Village Watershed Committee, thereby ensuring linkage

BOX 7.3: Natural resource management by Panchayats in Kolhapur and Nandurbar districts, Maharashtra

In Kolhapur district of Maharashtra, Panchayats have engaged in tree plantation drives and watershed development. Forest protection and conservation committees have been formed in villages. Jambur Gram Panchayat, for example, has worked on soil and water conservation, and planted trees. It has also adopted a resolution banning cutting of trees and free grazing. In Nandurbar district, Panchayats have planted a million trees and are implementing watershed development projects. Soute and Padvalwadi Gram Panchayats are taking steps to stop land degradation and cutting of trees.

Source: SOPPECOM, 2011.

between the Panchayat and the Watershed Committee. The Gram Panchayat maintains assets created by the watershed development project and charges users (TARU, 2011b).

There are examples in Maharashtra of Gram Panchayats undertaking social forestry and tree plantation (Box 7.3).



Photo: Manoj Nair

Key challenges to management of natural resources by PRIs

Inconsistent devolution

The 73rd Constitutional Amendment made it imperative on the state governments to devolve functions, functionaries and finance to the various tiers of PRIs besides amending existing laws and rules related to subjects like agriculture, irrigation and forests in line with their respective Panchayati Raj legislation. While states have made mention of devolution of many of these subjects, overall, the ground situation remains challenging in terms of the actual role played by PRIs in management of natural resources. Natural resources continue to be considered in piecemeal fashion and not as requiring integrated planning and implementation (Vani, 2002). As a result, in several cases, the management strategy or rules have been designed for maximizing exploitation of resources rather than sustainable management (*ibid*). Furthermore, micro-level information that is needed for integrated planning is not available at the ground level.

While various Panchayat Acts include sections pertaining to devolution of management of natural resources, there

are sectoral laws that have a larger bearing on the way natural resources are governed. These sectoral laws have remained largely unchanged, making the provisions of devolution in Panchayati Raj Acts ineffective. Existing laws on forests, land resources, irrigation, drinking water supply, soil and water conservation, and fisheries have accorded 'line agencies' a monopoly over control and management of natural resources (*ibid.*). 'Activity mapping', through which the roles and responsibilities of each PRI tier are defined, is not clear and not based on the nature of the resource to be governed. For example, forests have significance at national/global (carbon sequestration, genetic diversity), regional (markets for NTFPs, species migration, landscape-based approaches) and local (community dependence for provisioning) levels. Devolution to different levels should stem from the nature of the resource as above. In short, while many state Panchayat Acts mention the role of different tiers of PRIs, their actual functioning is limited due to lack of effective devolution, multi-sectoral coordination, capacity and information. Further, in some states like Jharkhand, Chhattisgarh, Arunachal Pradesh and Odisha, traditional institutions for management of natural resources are still active and take key decisions. The relationship between PRIs and traditional institutions needs further clarity.



Photo: Foundation for Ecological Security



Photo: Foundation for Ecological Security

Decentralized governance or co-management of forests?

The 73rd Constitutional Amendment gave PRIs jurisdiction over social and farm forestry and minor forest produce (MFP). While this was a move towards political decentralization, this requires harmonization with existing administrative arrangements. For instance, following the Forest Policy of 1988, MoEF in 1990 issued guidelines on JFM to seek support of the local communities in regenerating degraded forests and afforestation (see Chapter 6 for more details on JFM). The policy envisaged creation of village institutions that will support state Forest Departments in protection and regeneration of forest areas and would in return benefit from timber, fuel wood, fodder and NTFPs as *quid pro quo*. Currently, there are around 1,18,213 JFMCs in the states covering around 22.94 million hectares (MoEF and MoTA, 2010).

Joint Forest Management has given several positive outcomes in different locations like improved protection, increased availability of firewood and NTFPs, and, in some cases, a share in the timber proceeds for local communities. However, as discussed in Chapter 6, JFM is not supported by any specific law and is being run as a programme under executive orders of the government. At present, JFMCs function as parallel bodies to Panchayats in the villages, sometimes leading to jurisdictional overlaps.

The challenges of implementing PESA

The implementation of PESA in states with Schedule V Areas has been extremely variable. The unique definition of 'village' and Gram Sabha in PESA, as a self-governing unit in accordance with customs and traditions, has not been adhered to by a number of states in their legislation. In many states, enabling provisions for the Gram Sabha's control over prospecting of minor minerals, planning and management of water bodies, control of minor forest produce, and right to be consulted before land acquisition are not yet in place.

A grey area in the PESA legislation is the option it offers to empower either the Gram Sabha or 'Panchayat at appropriate level'. Most states have chosen to empower the latter, thereby diluting the overall spirit behind the legislation to strengthen the self-governing village community. Further, many states are yet to frame rules under PESA and the state and central laws relating to mines and minerals, forests, and land acquisition are not yet compliant with PESA (MoPR, 2010).

Notwithstanding all these challenges, PRIs are best placed to govern natural resources as they have a statutory status, are democratically elected, and provide institutional continuity. Panchayats have potential as overarching governance bodies under which various resource user committees can work.

The Biological Diversity Act

The Biological Diversity Act, 2002 (BD Act) provides for the conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and related matters (Box 7.4).

The BD Act requires the government to develop national strategies and plans for the conservation and sustainable use of biodiversity, carry out Environmental Impact Assessments (EIA) for projects that are likely to affect biodiversity, integrate biodiversity management into sectoral programmes, and protect traditional knowledge related to biodiversity. Biodiversity Heritage Sites are to be designated by state governments, who will then frame rules for management of such sites (IC Net, 2011).

The BD Act is implemented at national, state and local levels, through a decentralized three-tier system. At the national level, the National Biodiversity Authority (NBA) has been established by the Government of India. At state level, State Biodiversity Boards (SBBs) are established by the state governments, while at local level, Biodiversity Management Committees (BMCs) are constituted by local bodies – PRIs and urban local bodies.

Under the BD Act, every local body has to constitute a BMC for promoting conservation, sustainable use

and documentation of biological diversity. State governments are to establish local biodiversity funds at the level of Panchayats that are to be used by the latter for conservation of biodiversity and benefits to local committees. It is estimated that at present there are 33,077 BMCs across 14 states. Also, 26 out of 28 states have established SBBs, and 14 states have notified rules (Table 7.1).

TABLE 7.1: Status of implementation of the Biological Diversity Act

Number of State Biodiversity Boards established	26
Number of Biodiversity Management Committees formed	33,077
Number of states that have notified rules	14
Number of states that have notified lists of plants and animals that are on the verge of extinction	14
Number of People's Biodiversity Registers documented	1,121
Number of guidelines / notifications issued	4
Number of benefit sharing agreements signed	93

Source: NBA, 2011a and NBA website.⁴

BOX 7.4: Key features of the Biological Diversity Act

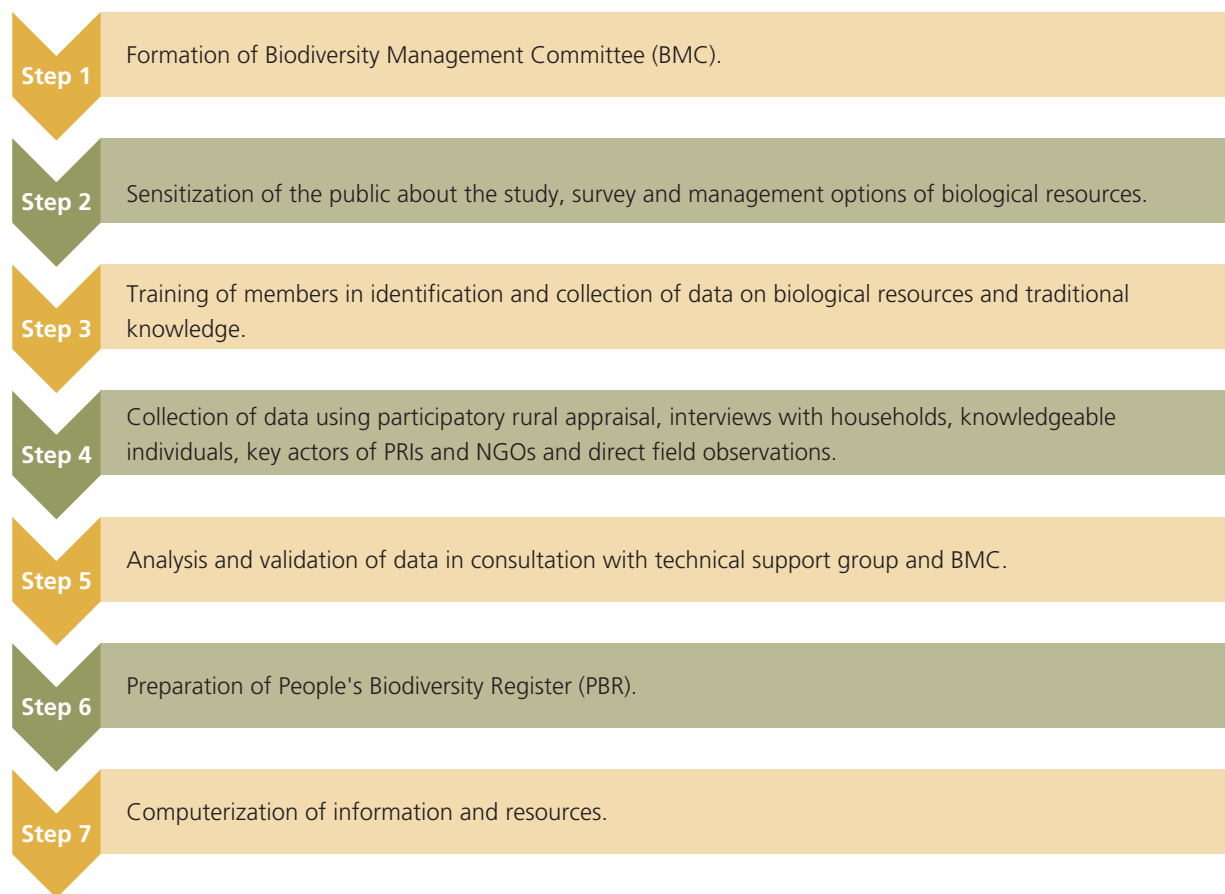
- Regulation of access to biodiversity and traditional knowledge, which is provided based on conditions of prior informed consent, mutually agreed terms, and equitable benefit sharing.
- Establishment of National Biodiversity Authority (NBA) and State Biodiversity Boards (SBBs).
- Establishment of Biodiversity Management Committees (BMCs) and local biodiversity funds at village level.
- Establishment of Biodiversity Heritage Sites.

Source: IC Net, 2011.

The BD Act makes it mandatory for the NBA and SBBs to consult BMCs before taking any decisions related to the use of biological resources. Section 21 and Rule 20 of the BD Act emphasize appropriate benefit-sharing provisions related to access and transfer of biological resources and knowledge obtained for commercial use. The time frame and quantum of benefits are decided based on mutually agreed terms between the applicant, the Authority, PRIs and other relevant stakeholders, including local and indigenous communities.

One of the main functions of the BMC is the preparation of a People's Biodiversity Register (PBR) that contains comprehensive information on the availability and knowledge of local biological resources, their medicinal utility or any other traditional knowledge associated

BOX 7.5: Process of preparation of PBR



Source: NBA, 2011a.

with them (see Box 7.5). People's Biodiversity Registers are key documents asserting the rights of local people over biological resources and associated traditional knowledge. So far, 1,121 PBRs have been developed in 10 states with the participation of various stakeholders (NBA, 2011a). People's Biodiversity Registers have contributed to India's National Biodiversity Action Plan and are in consonance with Targets 1 and 18 of the Aichi Biodiversity Targets (see Annexure 1).

Access by foreign persons to biological resources and associated knowledge of the people of India requires the prior approval of NBA. The Authority has signed about 100 Access and Benefit Sharing (ABS) agreements till date.⁵ People's Biodiversity Registers are yet to be concretely linked to ABS Agreements. There have been cases of BMCs and SBBs initiating action against bio-piracy. For example, BMC Mahanandi of

Kurnool district in Andhra Pradesh resolved to charge a multinational company an accession fee of INR 30 million for alleged bio-piracy. The Andhra Pradesh State Biodiversity Board proposed to initiate action against soft drink companies which are preparing 'herbal cola' based on the traditional knowledge of *Decalepis hamiltonii* in southern Andhra Pradesh (NBA, 2010).

Implementation of the Biological Diversity Act: challenges and prospects

Concerted efforts have been made by SBBs of Kerala, Karnataka, Madhya Pradesh, Andhra Pradesh and West Bengal to create awareness among stakeholders about the provisions of the BD Act. The performance of some BMCs is noteworthy (see Box 7.6 for an example).

BOX 7.6: BMC of Peringammala Grama Panchayat, Thiruvananthapuram district, Kerala

The Peringammala Grama Panchayat is at the foothills of the southern Western Ghats, in the buffer zone of Agasthyamala Biosphere Reserve. The Biodiversity Management Committee of Peringammala consists of villagers, researchers, wildlife enthusiasts, environmentalists, traditional tribal medical practitioners, farmers etc., and they are constantly in touch with scientists from various botanical, forest and agricultural research institutions. The BMC has prepared one of the best PBRs in the state with the participation of local people, students, NGOs, scientists and administrators. It has documented the traditional knowledge of medicinal plants of local tribal communities.

The BMC has initiated steps for promoting the cultivation of traditional crop varieties like wild rice, *Dioscorea*, *Colocasia*, *Xanthosoma*, *Artocarpus* etc. In order to protect crops from wildlife, the BMC has promoted bio-fencing using indigenous species like *Acacia catechu* and *Caesalpinia sappan*. It has held conservation education programmes for local residents, and taken steps for management of plastic and e-waste.

Source: Nomination for the GOI-UNDP India Biodiversity Awards, 2012.

Yet, after more than nine years since the formulation of the BD Act, its implementation overall remains sub-optimal. In most of the states, there seems to be a general lack of awareness about the importance of the BD Act. Similarly, awareness among communities about the objectives of the Act and benefits that could accrue to them with its implementation is, barring a few exceptions, quite poor (NBA, 2011b).

More focused efforts are required to ensure that the institutions necessary for implementing the provisions of the Act are created and adequately empowered. An expert committee constituted by the NBA to improve the functioning of BMCs has suggested a number of far-reaching changes (Box 7.7).

BOX 7.7: Improving the functioning of BMCs

- The State Biodiversity Boards (SBBs) need to take the initiative to form BMCs.
- The local body will constitute the BMC, with members drawn from membership of village forest protection and other natural resource management committees. Its secretary will be chosen from amongst the staff of government departments most closely linked to the natural resources of the BMC. The BMC will also include a Technical Co-ordinator.
- In addition to the preparation of PBR, the BMC will participate in ensuring conservation and sustainable utilization of biological resources through a number of defined activities.
- SBBs will provide operational guidelines to BMCs.
- Building awareness about biodiversity, the Act and Rules, and building capacities of government, NGO and BMC actors to be stressed.
- State governments are to appoint nodal officers in each district in consultation with SBBs. Biodiversity Management Committees will be guided to draw up action plans to raise resources, will obtain start-up funds from NBA and SBB, and will have defined procedures of funds flow and accounting for expenditure.

Source: NBA, 2011b.



Photo: International Fund for Agricultural Development

The Forest Rights Act and natural resource management

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (FRA) recognises and grants rights to Scheduled Tribes and other communities, who have traditionally been living in or depending on forest land for their legitimate livelihoods. The Forest Rights Act confers several rights on communities, the Gram Sabha⁶ and even individuals.

It broadly provides for two sets of rights – land rights, both private and common, and community rights over forest resources. The former include the ‘right to hold and live in forest land under individual or common occupation for habitation or for self-cultivation for livelihoods’. The latter include rights for collective management of community forest resources, rights over common property resources such as water bodies, grazing rights for both settled and nomadic communities, and ownership rights over NTFPs (Springate-Baginski *et al.*, 2008; also see Annexure 12).

The Forest Rights Act also has special provisions for protected areas with provision for declaring ‘critical wildlife habitats’. These are important wildlife areas that are to be kept inviolate, i.e. no human activity that is scientifically and objectively shown to damage wildlife is permissible in these areas. Although this implies that some livelihood activities of forest dwellers could be modified or restricted in these areas, the process through which this is to occur is transparent and consultative. Even in protected areas from where forest dwellers are to be resettled, it has to be done with prior, informed consent of the affected persons. Additionally, the Act states that the critical wildlife habitats cannot subsequently be used for purposes other than wildlife conservation (Kothari *et al.* 2009).

The actual implementation of the FRA, or more specifically the recognition of rights *via* claims, occurs through a multi-layered process conducted by various authorities (Box 7.8). These range from the Gram Sabha to committees at the sub-district, district and state level. The Act relies heavily on the Gram Sabha to drive the claims process forward. Although the power of final decision on the validity of a claim lies with the district committee, it is the Gram Sabha that starts the process to determine the nature and extent of individual or community forest rights (Kalpvriksh, 2008 and Gol, 2006).

BOX 7.8: Institutions and processes for implementation of FRA

The Forest Rights Act lays out a series of procedures, and creates or authorizes institutions at various levels, for its implementation.

- At the grassroots level, Gram Sabha is the authority to initiate the process of determination of rights which include receiving, consolidating and verifying claims. A Forest Rights Committee (FRC) at Gram Sabha level is constituted and authorized by Gram Sabha to assist it in its functions to collate, verify, and approve claims to rights.
- A Sub-Divisional Level Committee (SDLC) examines the Gram Sabha resolutions on rights claims and maps related to these claims, and provides its opinion on them to the next level of authority, the District Level Committee. The SDLC provides necessary support to the Gram Sabha and FRC to support the process for determination of rights.
- A District Level Committee (DLC) examines the claims it receives, and accepts or rejects them. The DLC is also required to ensure that necessary support is provided to Gram Sabhas to carry out their functions.
- A State Level Monitoring Committee (SLMC) assesses whether FRA is properly implemented. The nodal agency in the state is the Tribal Department, and the state appoints a nodal officer.
- At the national level, Ministry of Tribal Affairs is the nodal agency.

The FRA and its rules lay out the composition, functions, and processes of these institutions, and the relations amongst them.

Source: MoEF and MoTA (2010).

Community forest rights under Forest Rights Act

The provisions of the FRA on community forest rights (CFR) are extremely important for supporting community conservation where it is already happening, and also where communities are willing to take part in conservation and management of common resources. Community forest rights are far more numerous than

individual forest rights in the Act, and much more important from the point of view of collective access to forest resources, community living, and the ability and power to conserve forests. The provisions are crucial for changing the governance of forests towards more decentralization and site-specificity, while providing for a possibility of collective livelihood security to communities (Box 7.9) (Kalpavriksh, 2010 and MoEF and MoTA, 2010).

BOX 7.9: Community forest rights in the FRA

Section 3(1) i of FRA provides:

- A unique opportunity for forest-dependent communities to claim and manage forest resources in order to achieve the twin objectives of biodiversity conservation and sustainable livelihood.
- The 'right to protect, regenerate or conserve or manage any community forest resource which they have been traditionally protecting and conserving for sustainable use'.

Section 2(a) of FRA defines a community forest resource as 'customary common forest land within the traditional or customary boundaries of the village or seasonal use of landscape in the case of pastoral communities, including reserved forests, protected forests and protected areas such as Sanctuaries and National Parks to which the community had traditional access'.

Section 5 of FRA addresses the powers and duties of forest rights holders. It provides for a legal option/right/responsibility to protect wildlife, forests and biodiversity while empowering Gram Sabha to regulate access to community forest resources and to stop any activity that may adversely affect the same.

Rule 4 (e) of FRA states that communities which claim rights under the Act have a right to 'constitute committees for the protection of wildlife, forests and biodiversity, from amongst its members, in order to carry out the provisions of Section 5 of the Act'.

Source: Kalpavriksh, 2010 and MoEF and MoTA, 2010.



Photo: Foundation for Ecological Security

Challenges in the implementation of FRA

Though the process of FRA implementation has just begun, there are some challenges facing the implementation of the Act, including issues such as: 1) convening of Gram Sabha meetings at incorrect levels; 2) extensive and wrong rejections/recognition of individual rights; 3) *de facto* exercise of powers on behalf of Gram Sabha or Forest Rights Committees by village-level officials; 4) inadequate monitoring by state-level Committees of the processes to be followed under the Act; 5) Exclusion of other traditional forest dwellers from the claims process; 6) low priority to recognising CFR, low number of claims and even lower acceptance; 7) lack of recognition of rights of forest dwellers to minor forest produce; and 8) lack of recognition of other community rights over forest resources (MoEF and MoTA, 2010; MoTA, 2012).

Photo: Sudin K.



The reasons for poor progress in the implementation of CFR include: (i) the widespread portrayal of the FRA as legislation for individual rights over land, as distinct from usufruct rights and other forms of rights; (ii) inadequate information collection and follow-up at higher levels in the government on CFR; (iii) confusion at the field level on the distinction between claims for development facilities and claims on forest resources; (iv) lack of baseline information on the existence of rights, and existence of customary practices relating to management, use and protection; (v) lack of clarity among communities and officials on how to determine and verify CFR; (vi) omission of the right to protect or manage community forest resources in the claim form; and (vii) open-access status of community forest resources (MoEF and MoTA, 2010).

Decentralized governance of natural resources in North East India

The North East states of India are Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura. They have unique systems of governance, based on traditional and community-based institutions as well as modern institutions created by the colonial and post-colonial state. It would be worthwhile to understand the administrative systems in these states before dwelling on the systems of forest governance in these areas (see Figure 7.1).

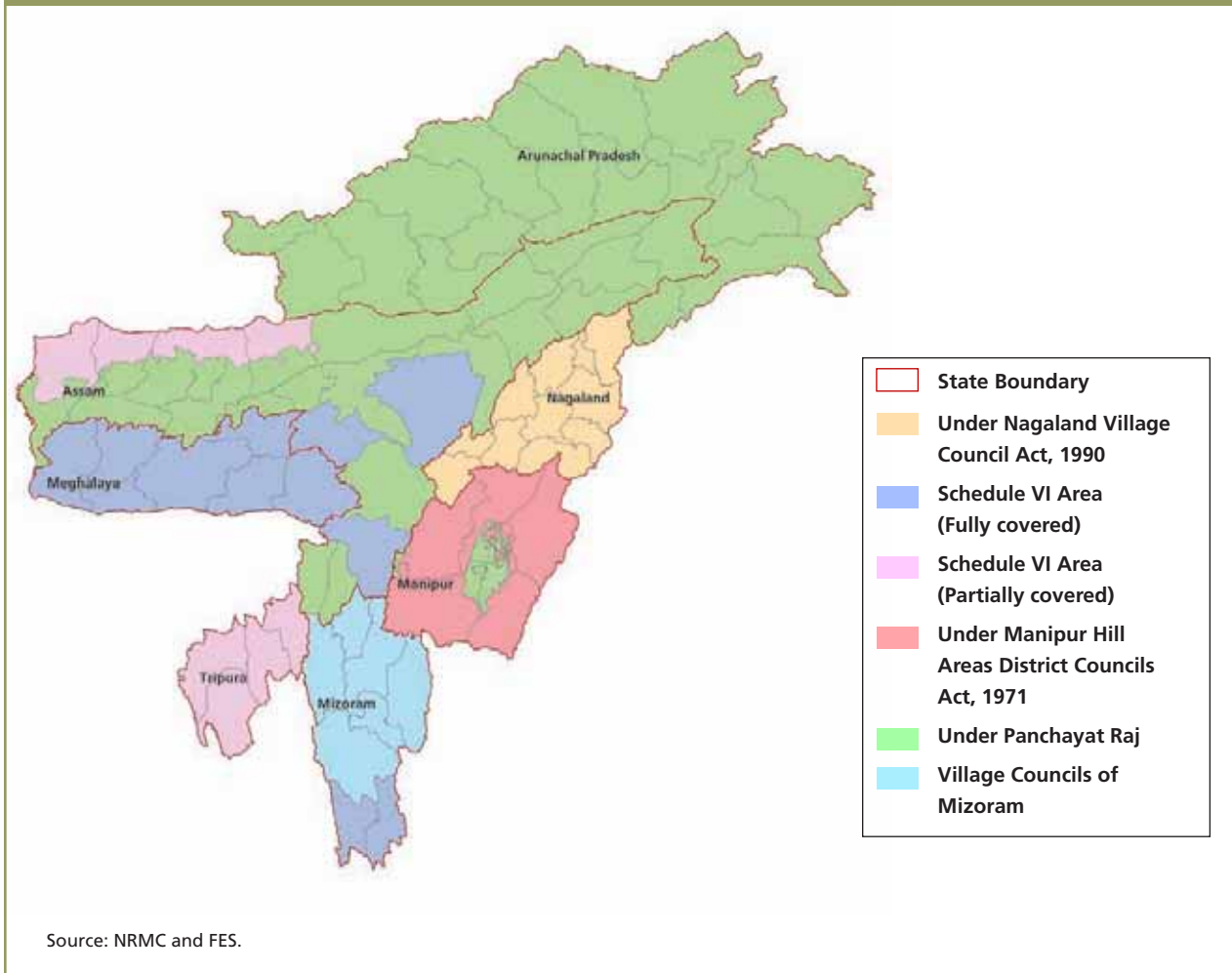
Areas covered by the 73rd and 74th Amendment

Sikkim, Tripura, Arunachal Pradesh, and large parts of Assam and Manipur come under Part IX and IX-A of the Constitution and have PRIs and urban local bodies as specified by the 73rd and 74th Amendments.



Photo: Zubeni Lotha/ UNDP India

FIGURE 7.1: Decentralized governance in North East India



Schedule VI Areas

Many of the North East states have a unique status under Schedule VI of the Constitution of India. The Schedule provides for the designation of the tribal areas of Assam (North Cachar Hills District, the Karbi Anglong District, the Bodoland Territorial Areas District), Meghalaya (Khasi Hills District, Jaintia Hills District, Garo Hills District), Tripura (Tripura Tribal Areas District), and Mizoram (Chakma District, Mara District and Lai District) as 'autonomous districts'. Further, the Schedule vests the Governor with the discretion to further divide the area or areas into 'autonomous regions' if there are different Scheduled Tribes in an autonomous district (Upadhyay and Jain, 2004).

In each autonomous district, the Schedule provides for setting up of a District Council (comprised of members

elected on the basis of adult suffrage and a few persons nominated by the Governor) and a Regional Council for each autonomous region.

The District Council is responsible for the administration of the district, while the Regional Council is in charge of the administration of autonomous regions. In a district that has a Regional Council, apart from the powers conferred upon the District Council under the Schedule, the District Council is dependent upon the Regional Council for powers delegated to it. The Schedule vests the District Councils and the Regional Councils with certain powers (see Box 7.10). All the laws made by the District Council become enforceable only after the Governor gives his approval (*ibid*).

There is also a provision for constitution of Village Councils, and these have been set up in many states.

BOX 7.10: Law-making powers of District and Regional Councils

- The allotment, occupation or use, or the setting apart of land, other than any land which is a reserved forest, for agriculture or grazing or for residential or other non-agricultural purposes, or for any other purpose in the interest of the inhabitants of any village or town
- The management of any forest not being a reserved forest
- The use of any canal or watercourse for the purpose of agriculture
- The regulation of the practice of *jhum* or other practices of shifting agriculture
- The establishment of village or town committees or councils and their powers
- Any other matter relating to village or town administration, including village or town police and public health and sanitation
- The appointment or succession of chiefs or headmen
- The inheritance of property
- Marriage and divorce
- Social customs.

Source: Upadhyay and Jain, 2004.

However, it must also be noted that the District and Regional Councils in Schedule VI Areas are themselves institutions that date back to colonial rule. They overlay a well-developed system of traditional governance institutions that have a longer history.

Areas other than Schedule VI Areas

Areas outside of those covered under the 73rd and 74th Amendments, and designated Schedule VI Areas also have different systems of governance. For example, Nagaland is covered by the Nagaland Village Council Act, 1990.

The hill areas of Manipur are covered by a state law, the Manipur Hill Areas District Councils Act, 1971. This Act has provisions similar to that contained in Schedule VI and has established six Autonomous District Councils in Manipur, covering five districts.

Forest governance in North East India

Forest governance in North East India differs from the rest of India, as vast areas of forests are under community control and community ownership, with much of the forests listed as 'unclassified'. At least two-thirds of the region's forests are officially under the legal authority of Autonomous District Councils, and are physically controlled and managed by rural people. Most state Forest Departments have been established only since the 1970s (Poffenberger *et al.*, 2007).

North East India is a mosaic of areas under different jurisdictional and legal treatments for forestlands. Some forest legislation in the North East states provides a supportive policy environment to community forestry. For instance, the United Khasi Jaintia Hills Autonomous District Act (1958) gives recognition to the customary patterns of landholding, though the management and control of these forests remains subject to the rules made by the District Council. In Mizoram, the Mizoram Forest Act of 1955 has provisions for village forest reserves and protected forest reserves, constituted for the benefit of the village community. Acts such as the Mikir Hills District (Transfer of Land) Act of 1959, and the Meghalaya Transfer of Land (Regulation) Act of 1971, ensure continuity of communal title within a tribal community. The Arunachal Pradesh Anchal and Village Forest Reserve (Constitution and Maintenance) Act, 1984, mandates sharing of revenue from lands at the disposal of the government between the government and the villagers in equal proportion (*ibid.*).

Indigenous institutions continue to play an important role in forest protection and management in North East states. In Nagaland and Meghalaya, over 90 percent of forests are under direct control of traditional village



Photo: Zubeni Lotha/ UNDP India

institutions, communities and private individuals. Village Councils and other community institutions have generally done fairly well protecting their forest resources (*ibid.*) (Box 7.11).

Challenges to decentralized forest governance in the North East

In North East India, over the past century, the role of communities in resource stewardship has been under pressure due to: 1) changing social structure and growing inequalities leading to reduced effectiveness of traditional institutions responsible for managing resources; 2) nationalization of forests and establishment of government forest agencies and laws; 3) development of silviculture as a dominant forest management system; 4) absence of formal mapping, boundary registration; 5) privatization, sedentarization of agriculture; and 6) growth of international timber markets and increasing entry of the private sector in rural resource use practices (Poffenberger *et al.*, 2007).

Communities in North East India have managed resources at landscape level for generations. In states like Manipur, Mizoram, Meghalaya and Nagaland, much

of the land designated as 'unclassified' forest are part of the *jhum* or swidden pool. These lands are cleared and burned for cultivation every five to 15 years. Expanding settlements, privatization and diversion of *jhum* lands for cash crops has taken land out of the communal *jhum* land pool resulting in a shortened *jhum* cycle, as well as disrupting traditional resource-use practices. Communities' resource planning capacities need to be strengthened to enable them to identify and demarcate areas suitable for *jhum* and enforce a sustainable *jhum* cycle (the ideal is 20-30 years, with a minimum of 10 years) (Poffenberger *et al.*, 2006).

To support community forest management in North East India, it will be necessary to revise existing or formulate new policies and legislation at the state and national level that give greater formal recognition to the authority of indigenous and traditional institutions and the validity of customary resource rights and management responsibilities. There is need for mechanisms and processes that can bring government officials, forest officers, scientists, and NGOs together to explore formulation of an enabling policy environment that will support local communities to act effectively as custodians of the region's forests (Poffenberger, 2007).

BOX 7.11: Indigenous community forestry institutions in North East India

Indigenous institutions in Meghalaya, Mizoram, Nagaland, and Arunachal Pradesh have changed their forest management systems after Independence by classifying and designating the community forest lands for specified purposes. Accordingly, in Mizoram, forest lands were classed as 'safety' and 'supply' reserves and placed under the authority of the Village Council. *Anchal* reserves were created in Arunachal Pradesh and were placed under the *Anchal Samitis* (Village Committees). In Meghalaya, *raid* land, *law kyntang*, *law niam*, *law ri sumar* and 10 other community forest types were formally acknowledged, operating under different community bodies with varying jurisdictions.

In East Kameng District of Arunachal Pradesh, the Nishi tribe has established elaborate controls over critical watersheds and forests with high natural beauty and biodiversity, including the protection of hilltop forests, forests around lakes and mountains (*sineiak*), forests in the vicinity of villages (*myoro tom*), and forests in niches and along drainages (*changtam bote*). In addition to forest protection, a variety of animals and plants are considered sacred and are not harmed.

Mokokchung District in Nagaland has historically divided their forests into blocks, one of which has for generations been designated as a conservation area. In recent years, they have decided to add two more blocks for conservation, as they no longer require them in their *jhum* (slash and burn cultivation) land pool.

In the East Khasi Hills of Meghalaya, the villagers of Mawphlang are building on 400-year-old sacred forest traditions by ordaining new forests in 18 other villages.

Source: Poffenberger *et al.*, 2007.

Decentralized forest governance in other states

Apart from the North East, decentralized forest governance models are found in a few other states as well. The Indian Forest Act, 1927 has a category called village forests. Village forests are those reserved forests which are assigned to village communities for management.

Van Panchayats of Uttarakhand

Following the promulgation of the 1878 Indian Forest Act, more than 75,000 hectares of land in Kumaon, (currently in Uttarakhand), was declared as reserved forests, and in 1910 this area was transferred from the Revenue Department to the Forest Department. The people of Kumaon revolted against this. In 1921, the then United Provinces Government constituted the Kumaon Forests Grievances Committee. According to the Committee's recommendations, the Uttar Pradesh hill forests were divided into two categories – Class I Forests and Class II Forests. Van Panchayats drawn from local communities were entrusted with the management of Class I Forests, and Class II Forests were kept under the direct control of the Forest Department (NFC, 2006). The state government passed the Forest Panchayat Act (Forest Councils Act) of

1931. This Act empowered villagers to form local-level management committees for hill forests. In 1931, the constitution of such village forests was clearly provided for in subsection (2) of Section 28 of the Indian Forests Act, 1927 (Negi *et al.*, 2011).

Van Panchayats continued to be formed under these provisions, and to operate under various Panchayat Forest Rules. They were formed mostly out of Revenue Wastelands titled Civil and Soyam Land, or from reserve forest land where there was no Revenue Land available for such allotment (Virdi, 2005). The Panchayat Forest Rules have been amended from time to time – major amendments having been made in 1972, 1976 and 2001 (NFC, 2006). About 12,064 Van Panchayats have been established in Uttarakhand that manage a forest area of about 5,23,289 hectares, forming about 14 percent of the total area of the state in 11 hill districts. Most of the Van Panchayat forests provide the villagers with important subsistence benefits such as fodder, fuel wood, and timber for house construction and agricultural implements. As per Van Panchayat Rules, villagers can decide their own rules for its day-to-day management. These rules relate to monitoring, dispute resolution mechanisms, selection of guards for enforcement of rules, fines for rule breakers, management of finances, equitable distribution of usufructs, and use of surplus earnings for the community. The Forest Department is



Photo: Foundation for Ecological Security

responsible for providing technical help to the villagers and it must be consulted before harvesting forest produce such as resin and timber. The officials of the Revenue Department are consulted for the enforcement of rules and sanctions if recalcitrant villagers refuse to follow local directives (Negi *et al.*, 2012).

The Van Panchayat Rules (2005) assign the task of looking after Van Panchayats to forest officials, including formulation of their management plan. This dilutes the power of elected committees of Van Panchayats and denies them the necessary authority and financial autonomy (Negi *et al.*, 2012).

Gramya Jungle in Odisha

Odisha has a history of voluntary forest protection by village communities, which in some cases dates back to the 1930s. The main objective of protection was to restore or maintain local ecological conditions and to check soil erosion of nearby agricultural fields. Gramya Jungles (Village Forests) were created by the feudatory states in the pre-Independence period for exclusive use by village communities to meet their daily needs. Villagers' substantial community rights in these forests, coupled with a weak state Forest Department presence, led to villagers' continued initiative in protecting and managing Gramya Jungles post-Independence (NFC, 2006). Odisha is said to have the largest number of self-initiated forest protection groups, some 70 or more years old, and a second wave of such groups is said to have begun in the 1970s and 1980s (Sarin *et al.*, 2003).

Partly based on the experiences of such Gramya Jungles in revenue forests and partly due to the overall spread of voluntary forest protection in the state, the Odisha government issued a resolution in 1996 that allowed forest areas under villagers' protection to be declared as Village Forests by the state Forest Department, and granted villagers rights to manage all NTFPs within them. However, Gramya Jungles face some jurisdictional issues such as: a) their provisions may not necessarily conform to the dominant JFM ideology, and b) Orissa Gram Panchayat Act, 1965 has vested the management of Gramya Jungles (treated as Protected Forests) within revenue village boundaries, with the Gram Panchayats (NFC, 2006).

Other initiatives for decentralized governance over natural resources

There have been other initiatives on decentralized management of natural resources with statutory backing. Two of these are examined below – Tree Growers' Cooperative Societies (TGCS) and Community Reserves.

Tree Growers' Cooperative Societies

Within the forestry sector, one of the pioneering attempts in community involvement was the establishment of TGCS to reclaim wastelands by establishing tree plantations. Under the TGCS model, cooperatives were provided with long-term leases to state-owned common lands (officially, 'revenue wasteland') for developing tree plantations and increasing fodder production.

Membership of each cooperative was generally limited to one village, although in practice other villagers could also participate. It included one member per household, each paying a nominal membership fee. The cooperatives established fuel wood and fodder plantations on the leased land and contracted local guards to protect the plantations against illicit grazing, tree felling and collection of various forest products (Cronkleton *et al.* 2012).

The programme was guided by an organisation that became known as the National Tree Growers'



Photo: Foundation for Ecological Security

Cooperative Federation Limited (NTGCF). By 2007, there were 548 tree growers' cooperatives (*ibid.*) A 2007 study of three TGCS in Rajasthan found that although it has been more than 10 years since external support to the three cooperatives ended, plantations in all three sites are still being maintained and are growing (*ibid.*).

The efforts of TGCS have often resulted in a significant increase in biodiversity. For example, the TGCS in Khorwad village in Anand district of Gujarat built an earthen dam, planted saplings and dibbled seeds of indigenous species on their land. The land, which earlier supported only about ten species of grasses, thorny shrubs and trees turned into a habitat for about 72 species.⁷

Community Reserves

The Community Reserves category was introduced through an amendment in the Wildlife (Protection) Act in 2002. Community Reserves can be declared by the state government in any private or community land not comprised within a National Park, Sanctuary or Conservation Reserve, where an individual or a community has volunteered to conserve wildlife and its habitat.

Community Reserves are declared for the purpose of protecting fauna, flora and traditional or cultural conservation values and practices. The rights of people living inside a Community Reserve are not affected. Four Community Reserves have been established in India so far. Box 7.12 describes a Community Reserve in Kerala.

BOX 7.12: Kadalundi-Vallikkunnu Community Reserve

Kadalundi-Vallikkunnu Community Reserve (KVCR) in Malappuram district of Kerala is an estuary with a unique ecosystem of mangroves and associated fauna. A large portion of the wetland is exposed to intertidal fluctuations and is ideal for proliferation of fish, arthropods, molluscs and other organisms. There are 36 migrating bird species and 75 species of Indian birds reported from this area. A total of 1,205 households live within the Community Reserve. The main sources of livelihood for the local people used to be fishing, coir retting⁸ and sand mining, of which the latter two were threatening the mangrove ecosystem.



Photo: KVCR

KVCR has been constituted as per the provisions of the Wildlife (Protection) Act, 1972. The Reserve has a six-member Management Committee. The member secretary is nominated by the Forest Department. The main objective of the Community Reserve is the protection of mangroves, migratory and local birds and their habitat. They have undertaken several activities like intensive awareness programmes for children and local people; planting of mangroves; discouraging coir retting and sand mining; cleaning of river banks and prevention of waste disposal in them; community participation in conservation; and preparation of a management plan.

To compensate for the lost livelihood opportunities due to prohibition of coir retting, the KVCR Management Committee started a coir factory outside the mangrove area and also provided training to the local people in cultivation of marine water mussels, which is more profitable than coir retting. All these have resulted in visible conservation gains. The extent of mangrove forests has expanded with consequent increase in aquatic fauna. The fishers report increase in fish catch and better income after the formation of the KVCR. Important commercial species like clams, prawns and mussels have re-emerged in the area.



Photo: M. Balan

Source: Nomination for the GOI-UNDP India Biodiversity Awards, 2012.

Conclusion and way forward

In this chapter we have examined various models of decentralized biodiversity governance operational in India. Among the most widespread is the model of devolution to PRIs. Panchayati Raj Institutions are statutory bodies with a mandate to manage natural resources, they are located at the grassroots, and are democratically elected and socially inclusive institutions. In Scheduled Areas, Panchayati Raj legislation has gone a step further by placing the traditional self-governing village community at its centre and conferring upon it powers and rights over natural resources. The main challenges faced by PRIs include inconsistent devolution of functions, functionaries and finances by state governments. In the case of forestry, the debate over the respective roles of PRIs and JFMCs is yet to be resolved. In the case of PESA, the state-level legislations and Rules are not yet entirely compliant with the national law, and other existing state legislation is yet to be amended in line with the objectives of PESA.

The BD Act is implemented through a decentralized three-tier system that, at its lowest level, dovetails with Gram Panchayats at the level of BMCs. The Act requires the BMCs to be consulted before taking any decisions related to the use of biological resources and

knowledge, and also tasks BMCs with preparation of PBRs. But despite their tremendous potential, BMCs' performance has been weak, largely due to inadequate awareness about the Act.

The Forest Rights Act is remarkable for the legal space it provides for community rights over forest resources and their usage. The Act's community forest rights provisions have the potential to decentralize forest governance. But progress in implementation of FRA has been slow.

Apart from these pan-Indian efforts at devolution of management of natural and biological resources, there are other models that are more localized, and have emerged largely from customary law. The North East has areas under different jurisdictional and legal treatments for forest lands, each with a unique policy history, where indigenous institutions continue to play an important role in forest governance. While the North East states still have good forest cover and host rich biodiversity, forest management is challenged by changes in social structure, infrastructure development, unsustainable commercial agriculture, and introduction of centralized systems of management. A similar problem faces the effectiveness of Van Panchayats in Uttarakhand, and Gramya Jungles in Odisha. However, relatively newer state-supported initiatives like the Tree Growers' Co-operative Societies,



Photo: Foundation for Ecological Security



Photo: Zubeni Lotha/ UNDP India

and the more recent Community Reserves under the Wildlife (Protection) Act show promise.

India has a robust legal and policy framework for decentralized biodiversity governance. However, the actual progress of decentralization is highly nuanced and vigorously contested. Despite this, the very initiation of decentralized governance opens up a plethora of possibilities for making biodiversity management more grounded, efficient and responsive to both ecology and livelihood needs. To harness this potential, a number of initiatives need to be taken:⁹

For better management of natural resources by PRIs and Gram Sabhas:

- Sectoral laws of the centre and states pertaining to forests, NTFPs, irrigation, land and water resources need to be amended to make them consistent with devolution of power to PRIs and to the Gram Sabha in Schedule V areas.
- Some state legislation on PESA needs amendment to conform to the definition of 'village' and 'Gram Sabha' in the central PESA Act; states that have not yet framed rules for operationalizing PESA need to be encouraged to do so.
- For subjects related to natural resources, 'activity mapping' should be done based on the nature of the resource, and should clearly define the roles and

responsibilities of each PRI vis-à-vis community-based resource use and management groups, including traditional institutions. This must be accompanied by appropriate devolution of functionaries and finances.

- Information, knowledge and capacity needs of PRIs and Gram Sabhas for management of natural resources have to be addressed.
- Formal linkages of JFMCs with PRIs need strengthening. This will reduce operational conflicts between these two institutions and ensure long-term institutional sustainability of JFMCs.
- Biodiversity Management Committees need to be created in all urban and rural local bodies. Greater awareness about biodiversity, and the Biodiversity Act and Rules needs to be created among state governments, PRIs, BMCs, NGOs and rural communities. Capacities of all these actors need to be enhanced to implement the Act and Rules.

For better implementation of FRA:

- State governments should recognize the Gram Sabha at the individual settlement (hamlet or revenue village) level. Forest Rights Committees are to be reconstituted through open elections at the level of PESA or revenue village-level Gram Sabhas.
- The process of recognition of rights needs to be laid down clearly and made transparent.

- State policies related to NTFPs need to be harmonised with FRA. Value addition and processing, transport and marketing need to be facilitated by amending state transit rules.
 - Traditional community forest rights, rights of pastoral communities and habitat rights of particularly vulnerable tribal groups need to be recognised.
 - State governments should ensure that community forest rights relating to protection, regeneration or conservation or management of any community forest resource, which forest dwellers might have traditionally been protecting and conserving for sustainable use, are recognized in all villages.
 - State governments need to ensure adequate awareness about the FRA and Rules, and publicize the process by which rights are recognised.
 - Capacities for implementation of the Act, of revenue, forest and tribal welfare departments' field staff, Forest Rights Committees and Panchayat representatives need to be built.
- To improve forest governance in North East India:
- Existing policies and legislation at the state and national level need to be revised, or new legislation or policies have to be formulated, for greater formal recognition of the authority of indigenous and traditional institutions and the validity of customary resource rights and management responsibilities.
 - There is a need for mechanisms and processes that can bring government officials, forest officers, scientists, and NGOs together to create an enabling policy environment that will support local communities to act effectively as custodians of the region's natural resources.
 - Forest Department staff has to be oriented on indigenous resource management institutions, traditional rules and regulations, and territorial authority. They have to assist in establishing community titles to ensure that community forest lands are conserved.

Endnotes

¹ At present, there are approximately 585 District Panchayats, 6,610 Intermediate-level Panchayats and 240,522 Village Panchayats in India. There are approximately 2.8 million (2,769,009) elected Panchayat representatives in all states and union territories, including 16,311 elected District Panchayat representatives, 162,178 elected Intermediate Panchayat representatives and approximately 2.6 million (2,590,520) elected Village Panchayat representatives. Of these, approximately 18 percent are from the Scheduled Castes, 10 percent from the Scheduled Tribes, and 34 percent are women (NRMCA and TARU, 2012).

² The Indian Constitution empowers the President of India to declare communities or part or a group of communities in a state as Scheduled Castes or Scheduled Tribes, in consultation with the Governor of the state. The Constitution also empowers the Indian Parliament to include or exclude communities, or a part or a group of them, to the list of Scheduled Castes or Scheduled Tribes. The criteria for inclusion of communities in the list of Scheduled Castes are 'extreme social, educational and economic backwardness arising out of the traditional practice of untouchability' (Ministry of Social Justice and Empowerment, Government of India. Available from <http://socialjustice.nic.in/faqs1.php#sc1>. Accessed 15 September 2012). The criteria followed for specification of a community as a Scheduled Tribe are (a) indications of primitive traits, (b) distinctive culture (c) geographical isolation, (d) shyness of contact with the community at large, and (e) backwardness. These criteria are not spelt out in the Constitution but have become well established and accepted through the work of several Committees and Commissions constituted by the Indian Government (MoTA, 1996).

³ The Ward is the basic territorial constituency of a Gram Panchayat, each Ward electing a member to represent it. The Ward Sabha is a meeting of all persons whose names are on the electoral rolls of the Ward.

⁴ Available from <http://nbaindia.org/link/241/34/SBB.html> (Accessed 10 August 2012).

⁵ Available from <http://nbaindia.org/text/19/Statusapprovalsagreementsigned.html> (Accessed 15 September 2012).

⁶ The Act defines Gram Sabha as 'a village assembly, which shall consist of all adult members of a village' (Gol, 2006).

⁷ Foundation for Ecological Security, personal communication.

⁸ Retting is a curing process during which coconut husks are kept in an environment of freshwater or saline water that encourages the action of naturally occurring microbes. This action partially decomposes the husk's pulp, allowing it to be separated into coir fibres and a residue called coir pith. The retting process used in coir fibre production generates significant water pollution.

⁹ The following section draws on MoEF and MoTA, 2010, and Poffenberger *et al.*, 2007.

The Future of Biodiversity Governance in India

8

Biodiversity governance in India is at a cross-roads. Despite several legal, policy and institutional frameworks, there are barriers, both existing and emerging, that threaten the prospects of effective biodiversity conservation in the country. Evolution is not only the cardinal principle of ecology but applies to biodiversity governance too. The rapid transformations taking place in the social and economic surroundings have started impacting biodiversity governance more strongly than ever before. There are new imperatives and priorities for biodiversity governance that range from valuing ecosystem services to adopting a landscape approach for development planning.

Introduction

India is currently passing through a critical phase in nation building. As noted by Ramachandra Guha (2010), India has three principal axes of diversity – region, religion and language. It has three principal axes of disparity too – class, caste and gender. It is also undergoing several transformations simultaneously – economic, agricultural, industrial, technological and democratic. Though the country has set its sights on a high growth trajectory, it has to deal with several challenges that the socio-political and economic transformations have thrown up. Despite the economic and technological progress made over the last few decades, large sections of society are yet to

benefit from this development. Inclusive growth aiming at poverty alleviation is thus a major objective of national public policy. Biodiversity governance in India has to be viewed in the backdrop of this complex socio-economic and political context. Notwithstanding heavy odds, India has been reasonably successful in securing its biological diversity through a range of governance initiatives consistent with the triple objectives of the CBD. The country is firmly set to pursue rapid economic growth, however, there are persistent constraints to biodiversity conservation. The challenges before the five biodiversity governance models have already been discussed in the respective chapters. This chapter captures the broad barriers to biodiversity governance and options for the way forward.



Photo: M. Balan

Barriers to effective biodiversity governance

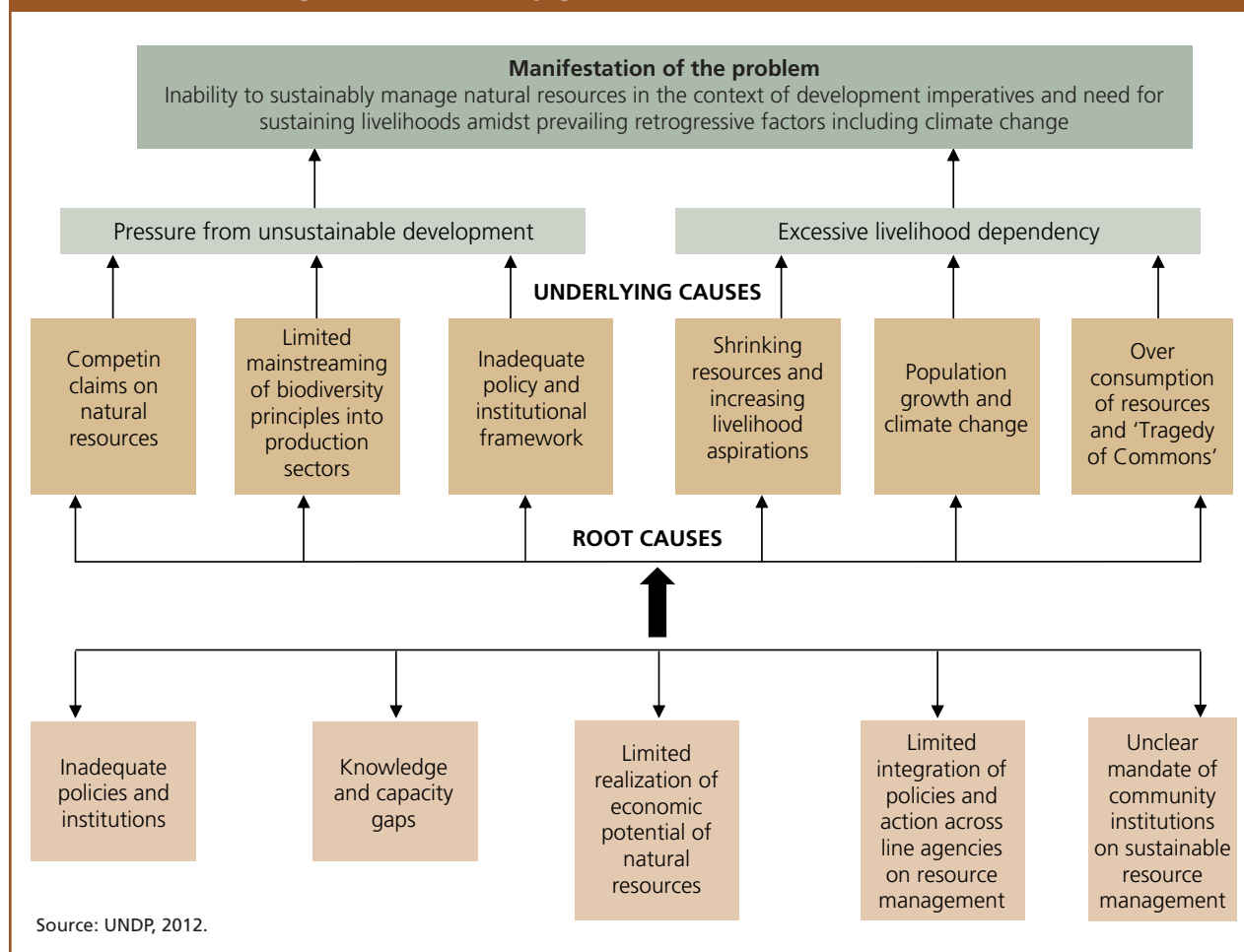
India's natural resources are under pressure from the disparate demands of development and livelihoods. In spite of the legal, policy and institutional frameworks mentioned in the previous chapters, there are barriers, both existing and emerging, that hinder sustainable management of biological resources. In a broader sense, there are direct proximate challenges such as pressure from competing land-use claims, extractive industries, and excessive livelihood dependencies. In a deeper sense, root causes for these include the conundrum of 'prevailing poverty-deepening environmental degradation', climate change, inadequate policies and institutions, knowledge and capacity gaps, limited realization of economic potential of natural resources, weak integration of ecosystem approaches across line

agencies, unclear mandate of community institutions, increasing human population etc. (see Figure 8.1). The following section discusses some of these key barriers.¹

Institutional barriers

Absence of coordinated decision-making/ planning system for natural resource management: India has a plurality of institutional, legal and economic planning frameworks – most of them sector-specific. This leads to competitive and overlapping claims and mandates that hinder smooth implementation of programmes and policies. These frameworks often exist and function in isolation from and /or parallel to each other making it impossible to coordinate programmes effectively. This leads to a number of challenges such as: a) weak enforcement of existing provisions related to biodiversity governance; b) non-integration of biodiversity conservation considerations into sector laws and policies; c) absence of harmony

FIGURE 8.1: Challenges to biodiversity governance in India



among specific sector laws and policies; and d) weak capacity to implement existing laws. In addition to this, policymaking inadequately accommodates the varied micro-level contexts of resource management, which often leads to a deadlock.

Limited economic incentives for sustainable resource use: Despite best intentions, the country has been unable to design economic incentives to develop business models based on sustainable use of natural resources. Markets for commodities from the primary sector do not differentiate between produce that is sustainably harvested and produce that is not. Such markets do not send positive signals to those involved in sustainable management of natural resources. This inability coupled with limited alternative livelihood options and insufficient support provided to local communities engaged in conservation and management of natural resources has led to poor implementation of conservation policies at the grassroots. Activities in the secondary and tertiary sectors too do not have adequate economic incentives for sustainable resource use.

Imbalance between macro-economic policies and biodiversity conservation objectives: There is a need to integrate and balance India's macro-economic policies with biodiversity conservation imperatives in such a manner that development goals do not clash

with conservation objectives. At present, there is weak understanding of the relationship that needs to be established between these two approaches, both at the planning and implementation level and among policymakers and officials in various departments. In addition to this, limited knowledge about the economic potential of ecosystem services, goods and their distribution poses a serious handicap in realizing the full potential of natural resources.

Knowledge and capacity barriers

Inadequate access to appropriate economic and scientific information: Planners and decision-makers from various sectors and agencies have inadequate access to appropriate scientific information and associated economic implications for analyzing trade-offs when making choices about the use of natural resources. As a result, adequate consideration is not given to the full range of impacts on either biodiversity or on different production sectors. Further, valuation of ecosystem services is yet to be carried out in a comprehensive manner across the country.

Limited understanding of landscape approach: Protected areas have been established largely on the premise of human exclusion. This logic still predominates most of the existing conservation initiatives. There is an



Photo: N. Vasudevan

increasing need (for both ecological and socio-economic reasons) to manage these areas from a landscape-wide perspective and with greater involvement of local communities. However, there is limited understanding and experience of initiatives that draw together a wide range of stakeholders to practice biodiversity governance at the landscape scale.

Limitations in demonstrating viable natural resource-based business models: Awareness and knowledge of business models built on sustainable resource use, particularly those incorporating traditional knowledge, are very limited in India. The contextualization of national/state-level policies on sustainable resource use at an appropriate scale of action is necessary for these policies to be effective at the ground level. Local institutions such as PRIs, BMCs, JFMCs etc. are yet to be involved in this process.

Community-related challenges

Limitations of knowledge and experience, and market barriers constrain the adoption of biodiversity conservation objectives in community-level land and resource-use plans and practices: In India's remote under-served communities, local knowledge and experience in incorporating biodiversity conservation objectives into community-level land and resource use practices is disintegrating or has already weakened. Left unaddressed, this will eventually lead to unsustainable resource use.

Limited scope and mandate of formal community institutions: Community-based biodiversity management institutions provide a strong programmatic baseline for mobilizing communities for sustainable natural resource management. But often, limited management capacity and narrow representation hamper mobilization of broad-based support from villagers. In addition, lack of access to technology and knowledge limit their ability to take effective action. The level of participatory decision making in most communities regarding the use of natural resources is inadequate and negatively affects their ability to serve as an effective forum for community feedback on land-use issues and conflict resolution. Further, such institutions lack the economic and financial incentives to switch from short-term resource exploitation to long-term stewardship. Community-based natural resource management models are also threatened by insecure and unclear land tenure and disintegrating traditional knowledge systems.

Way forward

India's strength in biodiversity governance lies in its varied approaches. However, as discussed in the previous section, the rapidly changing socio-economic context throws up new barriers and challenges to biodiversity governance that needs to be addressed on an urgent basis. This will be crucial for securing the ecological integrity of the nation. This section proposes 12 key policy and programme imperatives² for improving biodiversity governance in India.

Valuation of ecosystem services

A range of ecosystem services is provided across land/seascapes by functioning ecosystems (both natural and man-modified). Following the audacious attempt by Costanza *et al.* (1999) to estimate the economic value of Earth's biodiversity and ecosystem services that put the value at US\$ 33 trillion per year, well over the world's total Gross National Product (GNP), efforts to value biodiversity and incorporate this value in national accounting have been significantly strengthened. However, while ecosystem goods such as harvested resources or even genetic resources can be accorded



Photo: Manoj Chandran

financial values relatively easily, valuing ecosystem services remains a methodological challenge.

Measurement of natural capital and its depreciation can significantly alter the manner in which natural resources are exploited and can strengthen the political will to achieve sustainability. Appropriate accounting of natural capital depreciation into national planning and corporate operations, and internalization of environmental costs is an important step to mainstream biodiversity.

Besides this, assessment of biodiversity and ecosystem services provides insights into the scale of contribution of natural capital to economy and helps, for example, to design compensatory welfare measures for resource-dependent communities in proportion to the value of the resource base they are asked to forego.

Multi-disciplinary, academic and governmental efforts to further strengthen natural capital accounting are crucial, and could be informed by initiatives such as The Economics of Ecosystems and Biodiversity (TEEB).³

Valuation of ecosystem services is a pre-requisite to undertake green accounting of India's natural resources; significant in the context of ongoing and future developmental imperatives, sustaining and diversifying livelihoods, and as a strategy to address climate change. India has just begun a nation-wide attempt to assess the economic value of ecosystem services. Some of the basic issues that need to be factored into the valuation of ecosystem services in India are given in Box 8.1. The following methodological approach is suggested for a comprehensive valuation of ecosystem services in the country.

BOX 8.1: Key issues on evaluation of ecosystem services in India

- What are the key ecosystem services already identified as being provided by India's natural resources?
- How do ecosystem services support livelihoods (rural, semi-rural, semi-urban and urban)?
- What is the contribution of consumptive and non-consumptive values of ecosystem services for rural GDP and also to the regional and national GDP?
- How much do ecosystem services support various sectors (agriculture, forestry, fisheries, livestock, industry etc)?
- How does the provisioning of ecosystem services impact on and get impacted upon by market dynamics?
- Do some governance models maximize the benefits and distribution of ecosystem services? If so, how, which and why?
- What are the important policy, institutional, knowledge and community related issues, challenges and barriers related to maximizing ecosystem services?
- What are the distributional aspects of ecosystem services? Who benefits most? How much? Why?
- What is the current ecological status of India's ecosystems in terms of their ability to sustain ecosystem services?
- What is the degree of current threat perception across ecosystems in terms of ecosystem services and what stages of destabilization are they in?
- What are the micro and macro-level economic costs of degradation of ecosystems (both on spatial and temporal scale) including from climate change?
- What would be the economic cost of restoration of ecosystem services and its avoided destruction?
- What would be the cost of ecosystem-based adaptation options to restore the functionality of ecosystem services vs. infrastructural solutions to adaptation challenges?
- What would be the scope and potential of payment of ecosystem services in varied contexts - national, sub-national, regional and local levels?
- Do we look at current-use or counter-factual use patterns of ecosystem services?
- How do we conduct a rigorous analysis of distributional issues of ecosystem services particularly in the context of GDP of the poor and inclusive growth?

Phase 1: There are 10 biogeographic zones and 27 provinces in the country. To get a better macro-picture of the country, three different case study landscapes/ ecosystems corresponding to the following categories are proposed to be selected from each of these 27 provinces: a) intact ecosystems; b) moderately altered ecosystems; and c) degraded ecosystems. These samples are to be selected from reasonably sized meso-landscapes. Phase 1 is to focus on primary data collection from case study sites and collation and review of secondary data and its validation.

Phase 2: Focus on the assessment of distribution of ecosystem services across region, communities and society. It also proposes to look at incentives for positive conservation actions and compensation for foregone ecosystem services.

Phase 3: Assess the opportunity cost of ecosystem services vis-à-vis developmental imperatives and cost for restoration. This phase is also expected to give a directional perspective for the future by looking at the trajectory of economic growth and installing mechanisms for avoiding, offsetting, remedying and compensating loss of ecosystem services and/or its maximization.

Mainstreaming biodiversity considerations into commercial activities

Areas in and around India's high-value biodiversity zones are witnessing rapid economic changes and a surge in large-scale production sectors. Many of India's biodiversity-rich areas are also endowed with valuable mineral resources. Multiple-use management is becoming a reality in such areas. This often leads to contest over biodiversity-rich areas. In such situations, economic imperatives – a critical component of national development – often override biodiversity considerations. Further, policies and guidelines governing the operations of production sectors do not necessarily provide effective guidance on minimizing adverse impacts on biological diversity. Besides, experiences and capacities for effectively integrating ecological considerations in economic activities are limited and require significant scaling up.

Getting production sectors to factor biodiversity considerations into their operations is going to require a significant change in thinking and practice. It is partly about giving the appropriate 'push' by enshrining this thinking in the legal framework, but it is equally about



Photo: Tarun Kathula

drawing the sectors into discussion, bringing individual actors to the table, changing mind-sets, providing training and tools, and providing technical and financial ‘hand-holding’ to demonstrate the new paradigm, and absorbing some of the perceived risks in changing current practices. Even this requires substantial efforts and a two-step process would be needed. Step one – to begin a concrete dialogue with stakeholders, and step two – to home-in specific changes in current practices (UNDP, 2011).

Addressing governance gaps in coastal and marine biodiversity

The coastal and marine environment faces multifarious threats such as land-use change, urbanization, land-based polluting or extractive activities, excessive harvesting of resources, invasive alien species, increasing occurrence of disasters and climate change. The poorest of the poor and the most vulnerable ecosystems bear the brunt of this. Effective management of the coastal and marine environment is critical to sustainable development, particularly in achieving the MDGs and the Rio +20 agenda. The existing sectoral governance frameworks in the coastal and marine environment

are inadequate to address these complexities. This necessitates a new governance template that responds to development aspirations, maintains ecological integrity and ensures livelihood security of local communities. Recently, UNDP in partnership with the M.S. Swaminathan Research Foundation conducted a national expert consultation on coastal and marine biodiversity governance. The consultation identified a range of governance gaps and suggested recommendations to address them, such as creating a robust knowledge management system, ensuring inter-sectoral coordination, and mainstreaming biodiversity into production sectors (see Box 8.2).

India’s Wildlife (Protection) Act largely follows a terrestrial approach to protected area governance. This approach is not found appropriate in the context of coastal and marine protected areas where communities have overlapping stakes in the resources on which they depend for their livelihoods. This results in conflicts between the management objectives of coastal and marine protected areas and the interests of local fishers. Dovetailing the particularities of coastal and marine resource use into the legal and policy framework of the conservation sector is a high priority.



Photo: M. Balan

BOX 8.2: Recommendations for improving coastal and marine governance in India

One of the critical pre-requisites for an effective coastal and marine governance framework is the presence of a robust scientific database and knowledge management system. Despite the considerable body of knowledge developed by more than 130 institutions working in India on coastal and marine biodiversity, there are significant knowledge gaps. There is a need to reinvigorate knowledge generation, management and dissemination on coastal and marine issues. The support required includes building a cadre of dedicated scientific staff, identifying the research gaps and priorities, scaling up investments in research, and dissemination of research findings.

Governance of coastal and marine biodiversity is driven largely by sectoral approaches, with sectors pushing independent mandates that may often contradict and negate each other's objectives and priorities. The challenge is to usher in a new paradigm that is inter-sectoral in nature, bearing in mind the principles of landscape approach and the need to balance economic, ecological and livelihood concerns and aspirations. Further, the current conservation approach in the coastal and marine environment largely revolves around the perceived dichotomy between conservation and livelihoods of local communities. There now exist a number of win-win experiences in India, which combine livelihoods security and ecological conservation, including the ones in Chilika in Odisha, the Gulf of Mannar in Tamil Nadu and the Joint Mangrove Management Programme in Tamil Nadu, Andhra Pradesh and Odisha. These experiences need to be replicated, up-scaled and widely disseminated to help create a strong constituency among local communities to support biodiversity conservation.

There are new challenges emerging from rapid growth in ports, shipping, tourism, urban areas, coastal and off-shore mining, industrial activities and destructive fishing practices. It is important to understand the impact of production sectors on marine and coastal biodiversity, both in the coastal region as well as in the Exclusive Economic Zone. There is an urgent need to engage with stakeholders from the major economic sectors in shaping the long-term future of coastal and marine environments. Mainstreaming biodiversity conservation into production sectors is crucial for evolving an effective planning and management framework for coastal and marine governance.

At the national, state and local levels, there is a need to engage more with relevant departments and ministries and obtain political support for a coastal and marine governance framework that enshrines the above-mentioned paradigm. There is a need to expand the frontiers of marine and coastal governance by exploring the possibilities of transboundary management of coastal and marine biodiversity with neighbouring countries.

Poor and marginalized coastal communities, such as artisanal fishers, are particularly adversely impacted upon by degradation in the coastal and marine region and also by the multiplicity of legal frameworks. The existing structural framework governing coastal and marine biodiversity is inadequate to address the needs of the poor and marginalized. It is important to incorporate the concerns of marginalized people in the coastal and marine governance framework by providing them the opportunity to participate in decision-making, policy formulation and management processes.

Empowering communities to address the rapid changes taking place in the wider land/seascape remains a critical challenge. Efforts in this direction may include strengthening community institutions to articulate their views, community access to credit and markets, and capacity development for entrepreneurship. These initiatives should be supported by innovative programmes, linkages to the banking sector, and efforts to improve access to markets. Furthermore, the documentation of processes and their dissemination, replication and learning remains vital. Capacity development of marginalized communities and institutions needs to be sustained in the long-term to enable them to meet emerging challenges.

Source: UNDP and MSSRF, 2012.

Unlocking the economic opportunities of NTFPs

Notwithstanding, their enormous economic significance, there are several critical issues affecting the NTFP sector. The markets for these commodities are poorly studied and remain largely opaque, rights of collectors are tenuous, and access regulation is not supportive. Quite often, the collection practices are not sustainable and there is weak value addition. Moreover, primary collectors get a very small portion of the overall value of the produce.

Further, the high variation in the ecological, institutional and market conditions for various products in different regions, and the absence of commodity-specific and region-specific solutions compounds the situation. Capacity to promote sustainable NTFP use and financial benefits to local users as incentives for biodiversity conservation is relatively low at present. There are many gaps in our current understanding of the range of NTFPs used from forests, their classification, socio-

Photo: International Fund for Agricultural Development



economic values, technical packages, trade and market mechanisms, and policy and legal contexts for their sustainable use. The existing expertise and knowledge is poorly documented or is inaccessible. There is also a lack of appropriate methods and tools to promote sustainable use of NTFPs and successfully regulate trade, and the lessons from the field are rarely captured to inform/influence policy development.

There is need for a game-changing strategy, which ensures substantial and stable incomes, secure access and sustainable harvest of NTFPs. An increase in the share of the overall commercial value of NTFPs accruing to marginalized communities will have a strong impact on

poverty as well as the stability of democratic governance in India's less developed districts. Interventions aimed at greater transparency in the commercial value of NTFPs and more equitable sharing of value streams will incentivize the forest-dependent communities as well as the Forest Department to conserve biological diversity.

In view of the scale of the NTFP trade and their potential for income generation and in consideration of the national and multi-sectoral character of NTFP markets, there is a need to create an apex institution at the national level, say the National NTFP Board (NNB). The purpose of NNB will be to transform the markets for NTFPs such that: a) there is transparency in the market in terms of value, volume, quality grades, final use etc; b) there is high degree of competition, enabling entry/exit of investors, competitive determination of prices and allocation of NTFPs across users, reducing differences in prices across time and space, and 'normalizing' the rates of profit for investors in different nodes of the value chains; and c) there is investment in developing knowledge and technology (both at local level and end-use level) so that NTFPs can address high value end-uses, particularly in the pharmaceutical, industrial and chemicals sub-sectors. Together, these can result in a higher income stream for the marginalized communities that collect NTFPs and do primary processing. This will act as incentives for conservation of biological diversity.

Revamping the Joint Forest Management programme

Joint Forest Management (JFM) institutions provide an excellent programmatic baseline for mobilizing local communities to adopt sustainable forest management in the country. The JFM programme has grown and expanded to cover 1,18,213 JFMCs (in 28 states and one union territory) that are managing around 22.94 million hectares of forests. This programme is based on an executive order issued by MoEF in 1990, which was subsequently revised in 2000 and 2002. As the country prepares to expand the coverage of JFM further, it is important to revise this guiding instrument to incorporate changes in forest governance that have occurred in parallel. For instance, while JFMCs have emerged as important grassroots level institutions for the co-management of forests, their formal linkages with PRIs and BMCs need strengthening. This will reduce

operational conflicts and ensure long-term institutional sustainability of JFMCs. The Ministry of Environment and Forests had recommended to the state governments⁴ to bring JFM under the supervision of the Gram Sabha and JFMC to be recognized as an organ of the Gram Sabha under the relevant laws concerning PRIs. These recommendations are critical in taking JFM forward; but they also need to be incorporated into national JFM guidelines. This will have an important bearing on the future of JFM.

Another significant opportunity for revamping JFM in India lies in forging its linkages with NTFPs and medicinal plants. It is observed that in several places, in the absence of viable resource-based enterprises that provide significant income generation, JFMCs have become disincentivized and eventually dysfunctional. Developing sustainable economies of scale in the use of forest resources at the local level is crucial to infuse confidence and sustain the interest of local communities in JFM. Medicinal plants and NTFPs have the potential to fill this void and bring in sustainable business models that will provide valuable income to local people. Enhanced linkage of JFM and NTFPs and medicinal plants can decisively address the dual issues of biodiversity conservation and poverty eradication in the country.

Further, JFM needs to address the requirements and priorities of women and other marginalized sections of society in a more proactive manner. There is a need to harmonize JFM with the provisions of the Forests Right Act. There is also a need to make traditional community forest management work in sync with JFM programmes at the local level, thus ensuring maximum participation of local communities in biodiversity conservation and forest management. Many more systematic ecological studies need to be undertaken at macro and micro-level to understand the impact of JFM on regeneration, biodiversity conservation and biomass accumulation.

Harnessing the Forest Rights Act and harmonizing legal framework on biodiversity governance

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 is as much about managing biodiversity at the grassroots level as it is about recognition of historical rights of forest dwellers. The Act empowers local communities to protect and sustainably manage forest biodiversity. This is an innovative legal provision that devolves the power over biodiversity governance to local communities by providing for the creation of local institutions for forest



Photo: Foundation for Ecological Security

governance. This enabling provision has the potential to remedy the legal and institutional lacunae in community-based forest management.

The Forest Rights Act has immense scope to address the challenges of poverty and biodiversity loss. It is important to harness the strength of this landmark legislation to transform local communities into responsible guardians of natural resources. Agencies like the Forest Department, Tribal Department and Panchayati Raj Institutions (PRIs) need to create synergies and provide adequate capacity building support to the Gram Sabhas so that they can discharge the conservation responsibilities vested in them.

This is particularly important since about 65 percent of the country's forest cover is spread across 188 tribal districts (FSI, 2009). Perhaps as a long-term objective, it is also worthwhile to look at the possibility of integrating five critical pieces of legislation related to biodiversity governance, i.e. the Forest (Conservation) Act, 1980; the Wildlife (Protection) Act, 1972; the Indian Forest Act, 1927; the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; and the Panchayats (Extension to the Scheduled Areas) Act, 1996 – into a single law. Such a harmonious integration of multiple legal frameworks will remove several impediments related to biodiversity governance, such as access over natural resources, overlapping mandates, land tenure issues and procedural ambiguity. It will also provide direction and clarity on conservation, sustainable use and equitable sharing of benefits arising out of use of biological resources.



Photo: Foundation for Ecological Security

Recognizing community conserved areas

As outlined in Chapter 4, India has numerous CCAs encompassing a broad spectrum of habitats and landscapes. The CCAs are critical for maintaining ecosystem services and India's biological heritage. Despite their critical role, CCAs have not been recognized adequately. The last few decades have also seen them reeling under considerable pressure emanating from multiple quarters (increasingly commercial) – from erosion of traditional values to competing land-use claims – that threaten to undo conservation gains (UNDP, 2012). For CCAs to survive and engage in effective conservation of natural resources, both government and civil society need to give greater political recognition to local community groups, grant formal recognition to the CCAs as a category of protected area system, carry out comprehensive documentation, and provide the necessary technical and financial assistance to the people engaged in conservation.



Photo: Manoj Chandran

The legal and policy framework also needs to be revisited to provide security of tenure over the area that CCAs conserve. Certain CCAs, if agreed to by the community, could be developed as Community Reserves under the Wildlife (Protection) Act. They could also legalize their autonomy by invoking the Forest Rights Rules, 2008 (Section 4.3) and draw on powers for biodiversity management provided for in Section 5 of the Forest Rights Act. The government may also provide financial incentives for the sustainable management of CCAs as part of conservation or rural development programmes. In addition, the mechanisms and lessons drawn from

CCAs should be shared with the larger CCA community, and for this, CCA networks at various levels would be desirable. These local, regional, state and national-level networks of CCAs would not only provide a platform for shared learning but also suggest the nature of support needed and advocate policy options.

Revitalizing production forestry

The growing need for wood and associated products is often overlooked in the discourse on biodiversity governance in India. The total industrial demand for wood, in terms of round wood equivalent (RWE) in India is expected to increase from 58 million m³ in 2000 to 153 million m³ in 2020 (FAO, 2009). India's territorial forests produce only approximately 3.175 million m³ of wood every year (FSI, 2011). This is already insufficient to meet the domestic and commercial requirement for wood in the country. Agroforestry, farm forestry and imports play a major role in bridging this gap between demand and supply. Similarly, of an estimated annual consumption of 250-300 million m³, only about 17 million m³ of fuel is sourced officially from forests. Part of this deficit is met by unorganized sourcing from forests and also from trees outside forests. It is estimated that trees outside forests have the potential to provide 42.774 million m³ of wood (FSI, 2011; MoEF, 2009; FAO, 2009).

As mentioned in Chapter 5, India has around 32.57 million hectare of lands under tree plantations (the second largest in the world after China), which accounts for 17 percent of the global forest plantation area. It has the largest share in the global plantation of teak (44 percent). Other main plantation species include eucalyptus, poplars, acacias, and rubber. About 50

percent of the plantations raised since 1980 are in agroforestry systems. In future, the supply from natural forests is unlikely to meet all the demands of wood and the trees outside forests, and agroforestry and farm forestry will become the main source of wood (FAO, 2009). This calls for a greater focus on agroforestry and farm forestry. Further, forest-based industrial units need to modernize and improve their efficiency so as to meet the growing demand of wood and associated products. These actions will have significant collateral gains for biodiversity conservation.

The growing stock of India's forests/trees is estimated at 6,047.15 million m³ (4,498.73 million m³ in forests and 1,548.42 million m³ outside) (FSI, 2011). However, compared to the global average of 2.1 m³/hectare/year, the productivity of India's forests is significantly low, with estimates ranging from 0.7 to 1.34 m³/hectare/year (FAO, 2009). There is a need to improve the productivity of India's forests, particularly that of production forestry, which in many places is affected by deteriorating site quality and second-rotation decline. Increasing forest productivity also has significant bearing on India's strategy to combat climate change. For example, if the productivity of forests could be doubled from the baseline, it would significantly exceed the carbon sequestration target (to sequester 6.35 percent of India's annual total GHG emissions by the year 2020) envisaged in the Green India Mission initiative under the NAPCC.

Investing in the capacities of governance institutions

Biodiversity governance in India is at a cross-roads as it faces conflicting priorities and complex challenges. Conservation institutions and community organizations that are engaged in biodiversity governance need enhanced capacities that will help handle the realities of changing times. For instance, the Forest Department staff (numbering around 115,000 and at the cutting edge of biodiversity management) requires enhanced capacities on social as well as broader conservation issues. This is particularly important, as participatory natural resource management (e.g. through JFM, BMCs and Forest Rights Act) has become an integral part of biodiversity governance. Similarly, more attention has to be paid to emerging issues such as invasive species, human-animal conflict and climate change. Changes



Photo: Anoop E.V.



in approach and focus also need to be reflected in the working plans and protected area management plans. This applies also to forestry research, where solution-based applied research is called for.

The Biological Diversity Act, 2002 has created a large network of institutions like the NBA, the State Biodiversity Boards (SBBs) and at the local level, the BMCs. Most of the SBBs require significant augmentation of capacities, both human and technical, to address the mandate they are vested with. Massive capacity building is also required at the Panchayat level to strengthen the BMCs on issues pertaining to preparation of the People's Biodiversity Register, ABS regime etc.

Promoting ecosystem-based adaptation approaches in development planning

According to the CBD, ecosystem-based adaptation (EbA) involves the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people adapt to the adverse impacts of climate change. This means tackling problems with solutions based on nature – for example, keeping a wetland system in place as a natural 'sponge' to absorb flash floods coming down from the mountains, in order to protect farmers' fields. India is highly dependent on natural resources – with a rural population of over 700 million directly dependent on climate-sensitive sectors (agriculture, forests and fisheries). It also has a large coastline, and faces high risk from natural disasters – about 65 percent of the country's area is drought-prone and 12 percent flood-prone (MoEF, 2010).

Healthy natural ecosystems can play a vital role in maintaining and increasing resilience to climate change and in reducing climate-related risk and vulnerability. Ecosystem-based approaches are increasingly seen as part of overall adaptation strategies that can help facilitate multiple social, economic and cultural co-benefits for local communities. The potential for upscaling and mainstreaming EbA into regular development planning in India is yet to be realized. Similarly, in the planning process, there is a skewed tendency to give priority to engineering solutions over natural ones. So far, there has been no assessment of the potential costs and benefits of EbA approaches to address climate change in India. There is no doubt however, that ecosystem management provides the unifying base for promoting climate change adaptation and disaster risk reduction, with the overarching goals of achieving sustainable development. India needs to capture EbA into its development planning more explicitly.

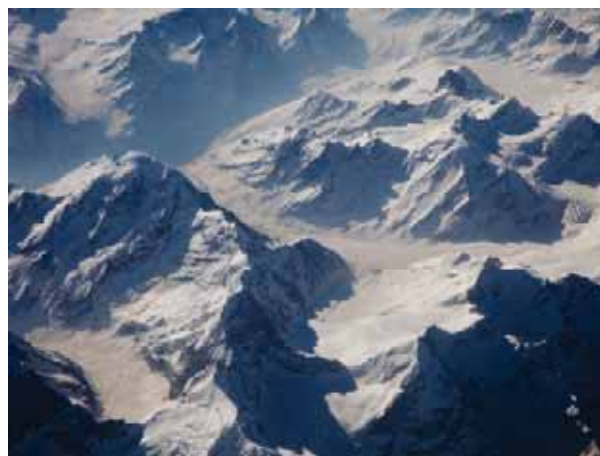


Photo: M. Balan

Expanding the frontiers of conservation

India has about 4.9 percent of its geographic area under the protected area network as against the 10 percent target envisioned in the NWAP (2002-2016). However, in India, protected areas imply National Parks, Wildlife Sanctuaries, Conservation Reserves and Community Reserves only. Large swathes of State-controlled territorial forests and most CCAs are outside its purview. If these areas were also considered part of the formal protected area network (with varying degrees of conservation status as provided for in the IUCN classification), then more than one-fifth of India's geographic area will fall under the protected area network. It would be



worthwhile if India could undertake a nation-wide exercise to compare IUCN protected area criteria with the existing protected area governance parameters, to reassess India's potential future contribution to global targets.

Given the escalating demand for land, the expansion of the protected area network poses a formidable challenge. Often formation of National Parks and Sanctuaries evokes resistance from various quarters due to a perception that protected areas hinder free access to resources. The application of Conservation Reserves and Community Reserves categories (two relatively new categories of protected areas introduced by amending the Wildlife (Protection) Act in 2002) may offer ways to further expand the protected area network since both these categories allow for sustainable use of natural resources. This is particularly true for coastal and marine protected areas. In addition, expansion of coastal and marine protected areas may also require amendments to the Wildlife (Protection) Act to create spaces for catering to their specific requirements.

Of late, there is a perceptible shift in protected area governance from a protected area-centric approach to a landscape-based approach by engaging a range of stakeholders, different government departments, agencies and civil society organizations across broad production landscapes. However, concerted efforts are required for mainstreaming protected area management into the development planning of the landscape, including capacity development.

A significant portion of India's biological resources lies outside the protected area network and is under grave threat in the absence of biodiversity mainstreaming policies governing these areas. Such areas act as stepping-stone corridors and play a vital role in ensuring ecological linkages in the landscape. They are also relevant in the context of climate change adaptation in providing scope for shifts in species distribution. The MoEF is implementing a scheme - Integrated Development of Wildlife Habitats - for strengthening wildlife conservation outside the legally designated protected area network. This programme needs more outreach and championing.

Climate change is projected to have significant impact on protected areas. However, building resilience to climate change and climate proofing of protected areas has not made much progress in India. Such efforts need to be initiated and/or strengthened. Further, given the high dependence on bio-resources in protected areas and the highly involved procedure for voluntary relocation of communities living therein, the identification and demarcation of inviolate areas pose a major challenge for protected area managers. This requires priority attention.

Moving towards landscape management

Resource planning in India is based largely on sectoral considerations. Sectors often pursue competing and contradictory objectives that contravene the objectives of prudent biodiversity governance. This necessitates ushering in a new spatial planning paradigm that takes into account the aspirations of economic growth, local livelihoods and ecological health. Landscape management becomes critical to national planning in this context. This approach transcends political and administrative boundaries and gives primacy to ecological integrity while accommodating diverse interest groups and resource-use claims.

The health of a landscape essentially hinges on its resilience and functional ability to continue provisioning ecosystem goods and services. Management effectiveness of a landscape unit is thus a function of: a) extent of ecosystems (geographic spread); b) continuity/connectedness with other landscape units; and c) functional networking of individual sub-systems.

BOX 8.3: Strategies for strengthening landscape management in India

- Strengthen national and sub-national capacities for planning adaptive management strategies for multiple-use landscapes including effective monitoring and enforcement.
- Secure access and land tenure rights for local communities.
- Secure livelihoods – ecosystem-based and alternative.
- Unleash the economic potential of sustainably-managed natural resources (e.g. ecotourism in protected areas).
- Enhance capacities to design, implement and manage landscape-level management systems.
- Mainstream the ecosystem approach into the developmental process of the region.
- Adopt a spatial planning process based on a landscape approach.
- Quantify the provisioning of ecosystem goods and services by multiple-use landscapes.
- Retain and upscale traditional knowledge for ecosystem management.
- Broaden the understanding of climate change impacts and quantify the ‘carbon capture’ potential of multiple-use landscapes.
- Identify key ecological corridors and dispersal areas.
- Strengthen management effectiveness of protected areas, forest fragments, forest production sectors, pasture lands and other high-value biodiversity areas in the landscape with community involvement.
- Develop and promote market opportunities for biodiversity-friendly production systems.

Integrated management of inter-connected ecosystems in the landscape constitutes an important strategy for natural resource management in the future.

It is crucial to chalk out a pragmatic strategy to engineer a transition from sector management to landscape management. Assuming that development models in the present paradigm will continue to be led by individual sectors and that current administrative and political boundaries will remain in place, it is important to start with the identification of viable meso-level landscape units on a national scale. This can be followed by preparation of broad-based landscape level plans

detailing the long-term vision for the governance of the landscape units. Subsequently, biodiversity-friendly sector plans could be drawn up that would dovetail good conservation practices into sectoral operations, even while they pursue sectoral mandates.

Such a landscape approach is a relatively new concept in India (see Box 8.3). Currently, UNDP in partnership with GEF and Indian government is pioneering this approach in three key multiple-use biodiversity-rich land/seascapes in the country – the Godavari basin (Andhra Pradesh); Sindhudurg coast (Maharashtra), and the High Ranges of the Western Ghats (Kerala).

Photo: M. Balan





Conclusion

This book has attempted to portray important attributes of India's biological diversity – its extent, resource-use patterns, intricate human-nature relationships, challenges and various governance arrangements. Despite all odds, the five biodiversity governance models described in this book have helped India in conserving its natural landscape to a great extent. However, times are changing, and so is the developmental context, with ever intensifying socio-economic pressures requiring an adaptive approach to biodiversity governance. There is no one-size-fits-all solution for effective biodiversity management. As mentioned earlier, neither 'exclusive' protected areas nor community-based conservation is a solution for all conservation problems.

The Indian experience of employing a range of governance models to balance conservation and development in different contexts has immense relevance across the world. It is not the aim of this book to pass judgment about any particular model – either in favour of or against. The objective is to provide a balanced picture of achievements as well as challenges faced and the lessons learnt. However, one picture is clearly emerging – while operating under different policy, planning and institutional frameworks, a common thread runs through all these models – an increasing shift towards a landscape approach anchored strongly on participatory approaches. It is hoped that this book will trigger a series of discussions that will further strengthen biodiversity governance in India.



Endnotes

¹ Adapted from UNDP, 2011 and UNDP, 2012.

² Specific priorities for each of the biodiversity governance models have been described in respective chapters.

³ Available from www.teebweb.org (Accessed 21 September 2012).

⁴ MoEF letter to Chief Ministers, 29 October 2010.

Annexures

Annexure 1

Strategic Goals and the Aichi Biodiversity Targets

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

Target 1

By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Target 2

By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

Target 3

By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.

Target 4

By 2020, at the latest, governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use

Target 5

By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

Target 6

By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Target 7

By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

Target 8

By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

Target 9

By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

Target 10

By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity**Target 11**

By 2020, at least 17 percent of terrestrial and inland water, and 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

Target 12

By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

Target 13

By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services**Target 14**

By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

Target 15

By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 percent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

Target 16

By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building

Target 17

By 2015 each party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

Target 18

By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

Target 19

By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

Target 20

By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by parties.

Annexure 2

List of wetlands of international importance (Ramsar sites) in India

S.No	Name of the wetland	State	Date of declaration
1	Keoladeo National Park	Rajasthan	1 October 1981
2	Chilika Lake	Odisha	1 October 1981
3	Wular Lake	Jammu & Kashmir	23 March 1990
4	Sambhar Lake	Rajasthan	23 March 1990
5	Loktak Lake	Manipur	23 March 1990
6	Harike Lake	Punjab	23 March 1990
7	Ropar	Punjab	22 January 2002
8	Kanjli	Punjab	22 January 2002
9	Pong Dam Lake	Himachal Pradesh	19 August 2002
10	Point Calimere Sanctuary	Tamil Nadu	19 August 2002
11	Vembanad-Kol Wetland	Kerala	19 August 2002
12	Tsomorari	Jammu & Kashmir	19 August 2002
13	Ashtamudi	Kerala	19 August 2002
14	Sasthamkotta Lake	Kerala	19 August 2002
15	Kolleru Lake	Andhra Pradesh	19 August 2002
16	East Calcutta Wetlands	West Bengal	19 August 2002
17	Deepor Beel	Assam	19 August 2002
18	Bhoj Wetland	Madhya Pradesh	19 August 2002
19	Bhitarkanika Mangroves	Odisha	19 August 2002
20	Surinsar - Mansar	Jammu & Kashmir	8 November 2005
21	Hokarsar	Jammu & Kashmir	8 November 2005
22	Uppar Ganga	Uttar Pradesh	8 November 2005
23	Rudrasagar	Tripura	8 November 2005
24	Renuka	Himachal Pradesh	8 November 2005
25	Chandratal	Himachal Pradesh	8 November 2005

Source: MoEF, 2012.

Annexure 3

Estimated faunal diversity of India

Taxonomic group	Number of recorded species		Percentage of recorded species in India
	World	India	
PROTISTA (Protozoa)	31250	2577	8.24
ANIMALIA			
Mesozoa	71	10	14.08
Porifera	4562	500	10.70
Cnidaria	9916	956	8.73
Ctenophora	100	12	12.00
Platyhelminthes	17504	1626	9.29
Rotifera	2500	330	13.20
Gastrotricha	3000	100	3.33
Kinorhyncha	100	10	10.00
Nematode	30022	2872	9.55
Acanthocephala	800	229	28.62
Sipuncula	145	35	24.14
Mollusca	66535	5152	9.57
Echiura	127	43	33.86
Annelida	12700	841	6.61
Onychophora	100	1	1.00
Arthropoda	998920	71339	7.14
Crustacea	35536	2941	8.28
Insecta	867381	61238	7.06
Arachnida	73440	5829	7.90
Pycnogonida	600	17	2.83
Chilopoda	3000	100	3.33
Diplopoda	7500	162	2.16
Symphyla	120	4	3.33
Merostomata	4	2	50.00
Phoronida	11	3	27.27

Taxonomic group	Number of recorded species		Percentage of recorded species in India
	World	India	
Bryozoa (Ectoprocta)	4000	200	5.00
Entoprocta	60	10	16.66
Brachiopoda	300	3	1.00
Chaetognatha	111	30	27.02
Tardigrada	514	30	5.83
Echinodermata	6223	765	12.29
Hemichordata	120	12	10.00
Chordata	48467	5131	10.59
Protochordata	2106	119	5.65
Pisces	21727	2634	12.12
Amphibia	5162	289	5.60
Reptilia	5817	460	7.91
Aves	9026	1232	13.66
Mammalia	4629	397	8.58
Total (Animalia)	1195567	89220	7.46
Grand Total (Protista+Animalia)	1226817	91797	7.48

Source: ZSI, 2011.

Annexure 4

Estimated floral and micro-organisms diversity of India

Taxonomic group	Number of recorded species		Percentage of recorded species in India
	World	India	
Algae	40,000	7,175	17.9
Fungi	72,000	14,500	20.1
Lichens	13,500	2,223	16.5
Bryophytes	14,500	2,500	17.2
Pteridophytes	10,000	1,200	12.0
Gymnosperms	650	67	10.3
Angiosperms	250,000	17,527	7.0
Viruses and bacteria	8,050	850	10.6

Source: MoEF, 2009b.

Annexure 5

Endemism in selected faunal groups in India

Taxonomic group	Percentage of endemism
Mesozoa	100.00
Acanthocephala	88.64
Oligochaeta	77.80
Platyhelminthes	71.88
Kinorhyncha	70.00
Gastrotricha	64.00
Amphibia	61.24
Reptilia	47.00
Arachnida	45.08
Hirudinea	42.37
Insecta	34.90
Annelida	28.00
Echiura	28.00
Crustacea	17.07
Aves	14.28
Mammalia	9.23
Pisces	8.75

Source: MoEF, 2009b.

Annexure 6

Endemism in different floral groups in India

Taxonomic group	Percentage of endemism
Angiosperms	35.3
Algae	26.8
Bryophytes	25.1
Fungi	24.0
Lichens	23.7
Pteridophytes	16.0
Gymnosperms	14.9

Source: MoEF, 2009b.

Annexure 7

Summary of protected area statistics in India

States/UTs	No. of National Parks	Area km ²	No. of Wildlife Sanctuaries	Area km ²	No. of Conservation Reserves	Area km ²	No. of Community Reserves	Area km ²	No. of protected areas	Area km ²
Andhra Pradesh	6	1388.39	21	11618.12					27	13006.51
Arunachal Pradesh	2	2290.82	11	7487.75					13	9778.57
Assam	5	1977.79	18	1932.01					23	3909.80
Bihar	1	335.65	12	2851.67					13	3187.32
Chhattisgarh	3	2899.08	11	3583.19					14	6482.27
Goa	1	107.00	6	647.91					7	754.91
Gujarat	4	479.67	23	16619.81	1	227.00			28	17326.48
Haryana	2	48.25	8	233.21	2	48.72			12	330.18
Himachal Pradesh	5	2271.38	32	7745.48					37	10016.86
Jammu & Kashmir	4	3925.00	15	10243.11	34	829.75			53	14997.86
Jharkhand	1	226.33	11	1955.82					12	2182.15
Karnataka	5	2472.18	22	4003.42	2	3.80	1	3.12	30	6482.52
Kerala	6	558.16	16	1822.86			1	1.50	23	2382.52
Madhya Pradesh	9	3656.36	25	7158.41					34	10814.77
Maharashtra	6	1273.60	35	14152.70	1	3.49			42	15429.79
Manipur	1	40.00	1	184.40					2	224.40
Meghalaya	2	267.48	3	34.20					5	301.68
Mizoram	2	150.00	8	1090.75					10	1240.75
Nagaland	1	202.02	3	20.34					4	222.36
Orissa	2	990.70	18	6969.15					20	7959.85
Punjab	0	0.00	12	323.70	1	4.95	2	16.07	15	344.72
Rajasthan	5	3947.07	25	5379.26	3	222.27			33	9548.60
Sikkim	1	1784.00	7	399.10					8	2183.10
Tamil Nadu	5	307.85	21	3521.95	1	0.03			27	3829.83
Tripura	2	36.71	4	566.93					6	603.64
Uttar Pradesh	1	490.00	23	5221.88					24	5711.88
Uttarakhand	6	4915.44	6	2418.61	2	42.27			14	7376.32
West Bengal	5	1693.25	15	1203.28					20	2896.53

States/UTs	No. of National Parks	Area km ²	No. of Wildlife Sanctuaries	Area km ²	No. of Conservation Reserves	Area km ²	No. of Community Reserves	Area km ²	No. of protected areas	Area km ²
Andaman & Nicobar	9	1153.94	96	389.39					105	1543.33
Chandigarh	0	0.00	2	26.01					2	26.01
Dadra & Nagar Haveli	0	0.00	1	92.16					1	92.16
Daman & Diu	0	0.00	1	2.19					1	2.19
Delhi	0	0.00	1	27.82					1	27.82
Lakshadweep	0	0.00	1	0.01					1	0.01
Pondicherry	0	0.00	1	3.90					1	3.90
India	102	39,888	515	1,19,930	47	1,382	4	21	668	1,61,222

Source: MoEF, 2012.

Annexure 8

Tiger Reserves in India

Sl. No.	Tiger reserve	State	Area of the core/critical tiger habitat (km ²)	Area of the buffer (km ²)
1.	Bandipur	Karnataka	872.24	*118.27
2	Corbett	Uttarakhand	821.99	466.32
3	Kanha	Madhya Pradesh	917.43	NA
4	Manas	Assam	840.04	2310.88
5	Melghat	Maharashtra	1500.49	NA
6	Palamau	Jharkhand	414.08	NA
7	Ranthambore	Rajasthan	1113.364	NA
8	Simlipal	Orissa	1194.75	1555.25
9	Sunderbans	West Bengal	1699.62	885.27
10	Periyar	Kerala	881.00	NA
11	Sariska	Rajasthan	681.11	NA
12	Buxa	West Bengal	390.58	367.32
13	Indravati	Chhattisgarh	1258.37	1540.70
14	Nagarjunsagar	Andhra Pradesh	2527.00	NA
15	Namdapha	Arunachal Pradesh	1807.82	NA
16	Dudhwa Katerniaghat- (extn)	Uttar Pradesh	693.70 400.09	NA NA
17	Kalakad-Mundanthurai	Tamil Nadu	895.00	NA
18	Valmiki	Bihar	*840.00	NA
19	Pench	Madhya Pradesh	411.33	NA
20	Tadoba-Andheri	Maharashtra	625.82	NA
21	Bandhavgarh	Madhya Pradesh	716.903	NA
22	Panna	Madhya Pradesh	576.13	NA
23	Dampa	Mizoram	500.00	NA
24	Bhadra	Karnataka	492.46	NA
25	Pench	Maharashtra	257.26	NA
26	Pakke	Arunachal Pradesh	683.45	NA
27	Nameri	Assam	200.00	144

Sl. No.	Tiger reserve	State	Area of the core/critical tiger habitat (km ²)	Area of the buffer (km ²)
28	Satpura	Madhya Pradesh	1339.26	NA
29	Anamalai	Tamil Nadu	958.00	NA
30	Udanti-Sita Nadi	Chattisgarh	851.09	991.45
31	Satkosia	Orissa	523.61	*453.25
32	Kaziranga	Assam	625.58	548.00
33	Achanakmar	Chattisgarh	626.195	287.82
34	Dandeli-Anshi	Karnataka	814.884	NA
35	Sanjay-Dubri	Madhya Pradesh	*831.25	NA
36	Mudumalai	Tamil Nadu	321.00	NA
37	Nagarahole	Karnataka	643.35	NA
38	Parambikulam	Kerala	390.89	252.77
39	Sahyadri	Maharashtra	741.22	NA
40	Biligiri Rangaswamy Temple	Karnataka	359.10	215.72
41	Kawal	Andhra Pradesh	893.23	1,125.89
	TOTAL		34,130.69	11,262.92

NA – Notification Awaited

* - Not yet notified

Source: Ministry of Environment and Forests, Press Note, 18 August 2010.

Annexure 9

Tiger status with regard to forest occupancy and estimated population (2006-2010)

State	Tiger Population			Tiger Forest Occupancy (km ²)		
	2006	2010	Increase/ decrease/ stable	2006	2010	Increase/ decrease/ stable
Shivalik-Gangetic Plain Landscape Complex						
Uttarakhand	178 (161-195)	227 (199-256)	Increase	1,901	3,476	Increase
Uttar Pradesh	109 (91-127)	118 (113-124)	Stable	2,766	2,511	Stable
Bihar	10 (7-13)	8 (-)	Stable	510	750	Increase
Shivalik-Gangetic	297 (259-335)	353 (320-388)	Stable	5,177	6,712	Increase
Central Indian Landscape Complex and Eastern Ghats Landscape Complex						
Andhra Pradesh	95 (84-107)	72 (65-79)	Decrease	14,126	4,495	Decrease
Chhattisgarh	26 (23-28)	26 (24-27)	Stable	3,609	3,514	Stable
Madhya Pradesh	300 (236-364)	257 (213-301)	Stable	15,614	13,833	Decrease
Maharashtra	103 (76-131)	168 (155-183)	Increase	4,273	11,960	Increase
Rajasthan	32 (30-35)	36 (35-37)	Stable	356	637	Increase
Jharkhand	-	10 (6-14)	-	1,488	1,180	Decrease
Central India	601 (486-718)	601 (518-685)	Stable	48,610	39,017	Decrease
Western Ghats Landscape Complex						
Karnataka	290 (241-339)	300 (280-320)	Stable	18,715	14,414	Decrease
Kerala	46 (39-53)	71 (67-75)	Increase	6,168	6,804	Stable
Tamil Nadu	76 (56-95)	163 (153-173)	Increase	9,211	8,389	Stable
Western Ghats	412 (336-487)	534 (500-568)	Increase	34,094	29,607	Decrease
North Eastern Hills and Brahmaputra Flood Plains						
Assam	70 (60-80)	143 (113-173)	Increase	1,164	2,381	Increase
Arunachal Pradesh	14 (12-18)	-	-	1,685	1,304	Decrease
Mizoram	6 (4-8)	5	Stable	785	416	Decrease
Northern West Bengal	10 (8-12)	-	-	596	799	Increase
North East Hills, and Brahmaputra	100 (84-118)	148 (118-178)	Increase	4,230	4,900	Increase
Sundarbans	-	70 (64-90)	-	1,586	1,645	Stable
TOTAL	1,411 (1,165-1,657)	1,706 (1,520-1,909)		93,697	81,881	

Source: Jhala *et al.* (2010), page xiii.

Annexure 10

List of landscapes and Elephant Reserves in India

S. No.	Elephant Range or Landscape	Elephant Reserve & date notified	State	Total area Km ²	PA [^] area in ER Km ²	Population in 2005
1.	East Central LS (South West Bengal-Jharkhand-Odisha)	1. Mayurjharna ER 24-10-02	W. Bengal	414	-	96
		2. Singhbhum ER 26-09-01	Jharkhand	4530	193	371
		3. Mayurbhanj ER 29-09-01	Odisha	3214	1309	465
		4. Mahanadi ER* 20-07-02	Odisha	1038	964	464
		5. Sambalpur* ER 27-03-02	Odisha	427	427	284
		6. Baitarni# ER	Odisha	1755	-	108
		7. South Odisha#	Odisha	4216	750	138
		8. Lemru#	Chhattisgarh	450	-	-
		9. Badalkhol-Tamorpingla#	Chhattisgarh	1048	1155	-
Total				17092	4798	1978
2.	Kameng-Sonitpur LS (Arunachal-Assam)	10. Kameng ER (19-06-02)	Arunachal	1892	748	
		11. Sonitpur ER* (06-03-03)	Assam	1420	420	612
Total				3312	1168	612+
3.	Eastern South Bank LS (Assam-Arunachal)	12. Dihing-Patkai ER (17-04-03)	Assam	937	345	295
		13. South Arunachal ER (29-02-08)	Arunachal	1957	378	129
Total				2894	723	424
4.	Kaziranga-Karbi Anglong-Intaki LS (Assam-Nagaland)	14. Kaziranga-Karbi Anglong ER (17-04-03)	Assam	3270	1073	1940
		15. Dhansiri-Lungding (19-04-03)	Assam	2740	275	
		16. Intaki ER (28-02-05)	Nagaland	202	202	30
Total				6212	1275	2245
5.	North Bengal-Greater Manas LS (Assam-West Bengal)	17. Chirang-Ripu ER (07-03-03)	Assam	2600	526+	658
		18. Eastern Dooars ER (28-08-02)	West Bengal	978	484	300-350
Total				3578	1010	1008

S. No.	Elephant Range or Landscape	Elephant Reserve & date notified	State	Total area Km ²	PA [^] area in ER Km ²	Population in 2005
6.	Meghalaya Landscape Meghalaya	19. Garo Hills ER (31-10-01)	Meghalaya	3500	402	1047
		20. Khasi Hills ER#	Meghalaya	1331	-	383
Total				3831	402	1430
7.	Brahmagiri-Nilgiri Eastern Ghat LS (Karnataka-Kerala-Tamilnadu-Andhra)	21. Mysore (25-11-02)	Karnataka	6724	3103	4452
		22. Wayanad (02-4-02)	Kerala	1200	394	636
		23. Nilgiri (19-09-03)	Tamilnadu	4663	716	2862
		24. Rayala (09-12-03)	Andhra	766	525	12
		25. Nilambur (02-04-02)	Kerala	1419	90	281
		26. Coimbatore (19-09-03)	Tamilnadu	566	482	329
Total				15320	5310	8572
8.	Anamalai-Nelliampathy-High Range LS	27. Anamalai (19-09-03)	Tamilnadu	1457	300	179
		28. Anamudi (02-04-02)	Kerala	3728	780	1726
Total				5185	1080	1430
9.	Periyar-Agasthyamalai LS (Kerala-Tamilnadu)	29. Periyar (02-04-02)	Kerala	3742	1058	1100
		30. Sirivilliputtur (19-09-03)	Tamilnadu	1249	568	638
Total				4991	1626	1738
10.	North Western LS (Uttarakhand-Uttar Pradesh)	31. Sivalik ER (28-10-02)	Uttarakhand	5405	1340	1510
		32. Uttar Pradesh ER (09-09-09)	UP	744	-	NA
Total				6149	1340	1510+
GRAND TOTAL				65271	18732	21200+

[^] PA: protected area

Approved by GOI, but not yet notified by State Government

* Proposal for extension approved by GOI, but not yet notified by State Government.

Source: MoEF, 2012. Various reports of Project Elephant Directorate.

Annexure 11

National level forestry research and training institutions

Institution	Primary mandate
Indira Gandhi National Forest Academy (IGNFA), Dehradun	Organises professional forestry training for IFS officers, skill upgrading and regular in-service refresher courses, training workshops and seminars for senior level foresters.
Directorate of Forest Education (DFE), Dehradun	Through its central academies at Dehradun, Coimbatore and Burnihat, it organizes professional in-service training for the State Forest Service Officers, mid-career courses and workshops and seminars. It also organises professional training courses for the Forest Range Officers at Forest Rangers College, Kurseong.
Forest Survey of India (FSI), Dehradun	Prepares State of Forest Report biennially, providing assessment of latest forest cover in the country; and conducts training of forestry personnel on resources survey, remote sensing and GIS.
Wildlife Institute of India (WII), Dehradun	Imparts training to wildlife managers, scientific personnel and field biologists; conducts research on wildlife and protected areas; and advises government on conservation and management of wildlife resources.
Indian Institute of Forest Management (IIFM), Bhopal	Conducts management training and research to equip personnel in forest-related professions with requisite skills and awards postgraduate diploma in forest management.
Indian Plywood Industries Research and Training Institute (IPIRTI), Bangalore	Conducts research on production of sawn timber, plywood and other allied engineering products; conducts diploma and vocational courses for wood industry personnel; and offers postgraduate programme in forest management.
Indian Council of Forestry Research and Education (ICFRE), Dehradun	Apex institution for forestry research and education in the country with eight research institutes and four advanced research centres under it.
Forest Research Institute (FRI), Dehradun	FRI, known earlier as Imperial Forest Research Institute, was established in 1906. It caters, in particular, to forest research needs of Punjab, Haryana, Chandigarh, Delhi, Uttar Pradesh and Uttarakhand. This institute also has the status of university and offers masters and postgraduate diploma courses besides offering doctoral programmes in forestry.
The Institute of Forest Genetics and Tree Breeding, (IFGTB), Coimbatore	Research on improving the productivity of forest tree species through conventional breeding programmes and biotechnological interventions.
Tropical Forest Research Institute (TFRI), Jabalpur	The Institute provides research support to forest management in central India particularly Madhya Pradesh, Chhattisgarh, Maharashtra and Odisha.

Institution	Primary mandate
Arid Forest Research Institute (AFRI), Jodhpur	It caters to the forestry research needs of the arid and semi-arid region of Rajasthan, Gujarat, Dadra Nagar Haveli and Daman-Diu union territories.
Himalayan Forest Research Institute (HFRI), Shimla	Conducts research on temperate ecosystems in the Himalayas.
Rain Forest Research Institute (RFRI), Jorhat, Assam	Caters to forestry related research and extension needs of the North Eastern region. An Advanced Research Centre for Bamboo and Rattan (ARCBAR) functions under the institute at Aizwal in Mizoram.
Institute of Forest Productivity (IFP), Ranchi	Caters to the forestry research needs of eastern India.
Institute of Wood Science & Technology (IWST), Bangalore	Established in 1988, it focuses on wood science. The Institute has now widened its research activities to tree improvement and wood energy.

Source: MoEF, 2007.

Annexure 12

Rights conferred on communities, Gram Sabhas and individuals by the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006

- Right to hold and live in forest land under individual or common occupation provided that
 - The land must be for the purpose of habitation or cultivation to provide for livelihoods needs
 - The land should be under occupation prior to 13 December 2005
 - The land claimed is restricted to the area under actual occupation
 - The land cannot be more than four hectares.
- Community rights such as nistar (user rights) or those community rights used in erstwhile princely states of India
- Right to own, collect, use and dispose of minor forest produce which has been traditionally collected within or outside the village. Minor forest produce includes all NTFP of plant origin (including bamboo, brushwood, stumps cane, honey, wax, tussar, cocoon, lac, tendu or kendu leaves, medicinal plants, herbs, roots, and tubers).
- Other community rights of use or entitlement, such as rights to fish and other products of water bodies, grazing or traditional seasonal access to natural resources by nomadic or pastoralist communities.
- Community tenure of habitat for particularly vulnerable tribal groups and pre-agricultural communities.
- Rights in or over lands under any categorisation in any State where there are any disputes regarding claims to such lands.
- Rights to convert leases or grants issued by any local authority or any State Government on forest lands to titles (ownership deeds).
- Rights to convert the following types of habitation into revenue villages: forest villages, old habitations, un-surveyed villages and other villages in forests.
- Rights to protect, regenerate, conserve, or manage any community forest reserves which the individual or community has been traditionally protecting and conserving for sustainable use.
- Rights that are recognised under any of the following kinds of law: State laws, laws of any autonomous district council, rights of tribals as accepted under any traditional or customary law.
- Right of access to biodiversity, and community rights to intellectual property in traditional knowledge related to biodiversity and cultural diversity.
- Any other traditional rights enjoyed which are not mentioned above. However, this excludes the traditional right of hunting or trapping or extracting a part of the body from any species of wild animal.
- Rights to rehabilitation on the individual's or community's currently occupied land or alternative land, in cases where they have been illegally evicted or displaced from forest land without receiving their legal entitlement to rehabilitation.
- Rights to development facilities. The Central Government will use forest land to provide for the following facilities to be managed by the Government, and these lands and facilities will be exempted from the operation of the Forest Conservation Act: schools, dispensaries or hospitals, fair price shops, electric and telecommunication lines, tanks and other minor water bodies, drinking water supply and water pipelines, minor irrigation canals, water or rainwater harvesting structures, non-conventional sources of energy, skill up-gradation and vocational training centres, anganwadis (pre-school centres), roads, community centres. However, the use of forest land can be allowed only if the forest land to be used is less than one hectare in each case, not more than seventy-five trees are felled per hectare and the clearance of such developmental projects is recommended by the Gram Sabha.

Source: Kothari et. al. 2009

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