

**ATREE EASTERN HIMALAYA/NORTHEAST INDIA
INITIATIVE**

Strategy and Operational Framework (2016-2026)



2016

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List of Acronyms

ATREE	Ashoka Trust for Research in Ecology and the Environment
CEPF	Critical Ecosystem Partnership Fund
EH	Eastern Himalaya
ES	Ecosystem Services
IBP	India Biodiversity Portal
IIG	Indian Insurgent Groups
LULCC	Land Use and Land Cover Change
NE	Northeast

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The spectacular Himalaya is under assault from the economic demands of a growing population, infrastructure development, regional conflicts, land degradation and climate change, with severe consequences for humanity.

I. Introduction

Perhaps no other part of the world is as rich in biodiversity as the Greater Himalaya. The Himalayan ranges of India alone constitute one of 34 global biodiversity hotspots – regions of the world extraordinarily rich in the number of species found nowhere else on earth. The mountains are home to two thirds of all species found in India and the Greater Himalayas, extending to the Tibetan Plateau and into southeastern China, harbor perhaps 10 percent of our planet’s total biodiversity. If the Himalayas as a whole are outstandingly rich in plant and animal life, the Eastern Himalayas are spectacularly so. The tiny state of Sikkim is just 7,096 square kilometers, but because its altitude ranges from 280 meters to 8,585 meters, the state contains examples of virtually every type of ecosystem encountered in the entire Himalayas – from lowland semi-evergreen forests to alpine meadows. It occupies less than 0.0025 per cent of India’s land area, yet hosts 20 percent of its plant and animal species.

The sheer abundance of the Eastern Himalaya’s ecosystems defies description. It is the teeming home to nine percent of the world’s mammals, including such iconic species as the Royal Bengal tiger, the greater one-horned rhinoceros, Asian elephant, red panda, snow leopard and clouded leopard – the smallest of the big cats. Its seemingly boundless and beautiful birdlife embraces the Bengal florican, blood pheasant, black-necked crane – worshipped as a reincarnation of an early Dalai Lama – the green magpie, fire-tailed sunbird and ten species of extravagantly beaked hornbills.

The story is repeated with its reptile, aquatic and amphibian species. The region’s thousands of plant species include breathtaking varieties of exotic orchids, rhododendrons, primroses and wild ginger. It features countless floral celebrities – cobra lilies, the blue poppy, the ethereal white bat flower and many more. The mountains are also a vast source of medicinal plants such as the ghostly looking Sikkim rhubarb, which when in flower punctuates hillsides like a spectral sentinel, almost two meters high and prized for its rarity and medicinal properties.

A recent World Wildlife Fund report records 353 new species discovered in the region between 1998 and 2008, including 61 vertebrates, among them Nepal's first scorpion, 16 reptiles, 14 frogs, 14 fishes, two birds and two mammals. Many remote ecosystems have yet to be fully surveyed. The state of Arunachal Pradesh, regarded as being among the richest places on earth, has been barely explored. Similar regions exist on the borders of Myanmar. The Arunachal macaque was identified only a few years ago, the world's smallest deer, the leaf muntjac, was first recorded in northern Myanmar in 1999.

In addition to being the Third Pole, the Himalayas are also Asia's water tower: the mountains serve as the watershed of the continent's eight largest rivers. More than 1.3 billion people (a fifth of the world's population) living in the basins of these rivers rely on their waters for sustenance. These ecosystems provide food, fiber, fodder, fuel wood, medicinal plants, wild pollinators, climate and water regulation and carbon sequestration. Biodiversity also has irreplaceable religious, spiritual and aesthetic value. Agriculture in the Himalayas is intertwined with, and relies on, surrounding biodiversity. Yet even before all its riches have been uncovered, this great natural life-support system is under serious threat.

II. Global Environmental Challenges to biodiversity, ecosystem services, and people's livelihoods in Eastern Himalayas/Northeast India

Environmental change, including **climate change**, presents humanity with a set of challenges which few – if any – of us, are yet truly prepared to confront, intellectually or psychologically. The scale and complexity of forward thinking and commitment required to mitigate this problem is unprecedented. It will require substantial financial, technical and human resources to prepare government and civil society to cope with the change sweeping the Himalayas

LULCC: Land use and land cover changes in EH have been documented by several researchers (Champion and Seth 1968) but there is little documentation on changes over time (Khan et al. 1997). Land-use change from forest to other usages has been conspicuous in the last few decades, causing depletion of natural resources in the Himalayas (Singh and Singh 1992). Rapid economic development and expanding agricultural activities have put pressures on forests and led to habitat alteration and forest fragmentation (Pandit et al. 2007). According to Shankar Raman (2001), the North Eastern states of India lost 378 km² of forest due to human-induced activities between 1989 and 1991; 488 km² between 1991 and 1993; and 175 km² between 1993 and 1995. A comparative analysis of overall land-cover change between the 1970s and the 2000s revealed a substantial increase of 17,394 km² of shrub-land, accounting for 3.3% of the total area of the EH. Forest cover decreased by 9,314 km²

(1.8% of the whole EH area) and grassland decreased by 3,261 km² (0.6% of the EH). Cultivated area changed by only 594km² (0.1% of the EH). The area of denuded and uncultivated land increased by 1,369km² (0.3% of the EH). Water bodies decreased by 10km².

Development activities: Threats to biodiversity have accelerated due to increased developmental activities in the last three decades in the Eastern Himalaya/Northeast India (EH/NE). Road building, mining, infrastructure and development activities through Government and corporate-supported schemes have raised environmental concerns, particularly the loss of valuable habitats, natural resources and degradation of key ecosystems. Additionally, a large number of hydropower projects have been commissioned all across the landscape. Many have already been built, resulting in the loss of forest cover, soil erosion, loss of aquatic life, degradation of riverine ecosystems and loss of vital underground water sources due to tunneling activities (Pandit et al 2007, Goswami et al 2012, Pandit and Grumbine 2012, Graham 2015). The long-term impacts of hydropower on the environment, biodiversity, livelihoods and socio-cultural fabric of the landscape are unknown. The recent devastating earthquakes of Nepal (2015) and floods in Uttarakhand (2013) have demonstrated that the geophysical environments of the Himalayas constitute risky and uncertain sites for large hydro projects.

Agriculture: Agriculture and natural ecosystems are inextricably linked in EH/NE. Significant threats to fragile ecosystems and biodiversity are posed by the shortening of the *jhum* cycle due to high incidence of shifting cultivation (prevalent in most states) (Raman 2007 Ramakrishnan 1984, Yadav et al 2012). Increasing use of chemical fertilisers impacts soil fertility, while pesticides are being widely promoted and used in many parts, though they contaminate the soil and water downstream and degrade insect and bird diversity. With the promotion of cash crops, large areas of privately and community-owned agricultural land and forest are being converted to monocultures/commercial plantations of economically valuable crops like rubber, kiwi, cardamom, tea, etc. The long-term impacts on biodiversity and ecosystem functions, processes and services are not well known. EH/NE is rich in agro-biodiversity, with many local varieties of agricultural crops, livestock races and extensive place-based knowledge on the use of medicinal plants and wild food plants. Unfortunately, the complex agro-biodiversity of this landscape is being eroded through the promotion of high-yielding crop and livestock varieties.

Urban areas: Urbanisation in EH/NE is producing urban sprawl in many areas (Devi 2012). Increase in peri-urban areas is putting tremendous pressure on the environment and natural resources. Water scarcity is a key problem, leading to further exploitation of natural springs and wetlands in the vicinity of towns.

Forests, wetlands and riverbanks are being converted to housing construction and other urban facilities to cater to the needs of urban and peri-urban populations. Large urban populations produce huge amounts of solid waste, and the currently practiced disposal systems put further pressure on forests and water bodies. Thus the quality of life in these densely populated urban and peri-urban spaces is highly compromised and there is increasing risk of disasters caused by weather-related events, which themselves are becoming more frequent.

Direct biodiversity threats: Many parts of EH/NE are still poorly surveyed, and the lack of biodiversity documentation is itself a major threat to biodiversity in this landscape (CEPF 2005). The region harbors many species ranked as Locally Extinct, Critically Endangered and Threatened. Furthermore, wide-scale hunting, poaching, habitat degradation, and illegal trade in bio-resources are impacting the flora and fauna of this biodiversity hotspot. Even the better-known areas have been studied for short periods of time; therefore there is little information to gauge the changes that are ongoing due to large-scale phenomena like climate change and economically-driven land use changes. Long-term monitoring is essential in various habitats across altitudinal gradients in the landscape.

Cultural changes: Besides local demand for resources, there are a number of emerging external threats to these sites. Increasing accessibility and political and economic integration have had impacts on traditional lifestyles and cultures of Northeast India, which have traditionally emphasized low intensity resource use. Economic amalgamation has reduced the autonomy of local communities, imposing risks of marginalizing them further because of competition from global market forces. Socially, migrant-urban encounters, tourism and exposure to urban life have raised the aspirations of local communities, and new values and modes of behavior have penetrated traditional norms. These changing values, resource-use patterns and demographics will be of great consequence to biodiversity conservation in the region.

Climate: The Himalayas are melting, glaciers are receding. Climate change is affecting the Himalayas more rapidly than almost anywhere, perhaps with the exception of the North and South Poles. From 1982 to 2006, the average temperatures in the Himalayan appear to have risen by 1.5°C, far higher than the Intergovernmental Panel on Climate Change predicted (Sherestha et al, 2014). Rainfall patterns too, have changed, with less rain in non-monsoon periods and bursts of excessive downpour during the monsoon. The highest rates of warming are in winter and the lowest, or even cooling, are in summer. There is progressively more warming with elevation, with areas above 4,000m experiencing the highest rates of warming.

Studies have shown that changing weather patterns are likely to impact biodiversity, ecosystem services and functions (Chapin et al. 2000; Sala et al. 2000, Shrestha and Bawa 2012, Telwala et al 2013). The agriculture and tea sectors will be particularly affected, as most of the agriculture in the region is rain-fed, and productivity of tea is dependent on optimal climate. Climate change impacts will be further exacerbated by ongoing unplanned development activities leading to loss of biodiversity and to livelihood vulnerability. The risk of disasters triggered by weather related events and exacerbated by unsustainable development activities is a key issue in public discourse in the region.

Chaudhury and Bawa (2011) studied local perceptions of climate change impacts on biodiversity. Local communities reported impacts like early budburst and flowering, new agricultural pests and weeds and appearance of mosquitoes. People at high altitudes appear more sensitive to climate change than those at low altitudes. Most local perceptions conformed to scientific data, though causal analysis might not. This suggests that local communities can participate in monitoring key environmental parameters, and that local information can be rapidly and efficiently gathered using systematic tools.

Human capacity: A further challenge in the region is related to the limited human capacity available to engage the issues mentioned here from an interdisciplinary perspective. Well-trained researchers and practitioners using modern approaches and methodologies are severely lacking. Therefore a constituency of trained people urgently needs to be developed in the EH/NE region to better inform stakeholders through rigorous research and documentation.

Governance: Similarly, environmental governance deficits create challenges relating to biodiversity and livelihoods, particularly in community-owned forests where there are conflicts between traditional versus modern natural resource management systems. There has been historical neglect of the region, and a history of natural resource exploitation. The region is rich in natural resources, but people are economically marginalized and depend directly on these resources for sustenance. Understanding the links between livelihoods and natural resources is vital; and action to catalyze livelihood enhancements while securing natural habitats is essential, especially within and around Protected Areas.

Language/ethnicity, tribal rivalry, migration, control over local resources and a widespread feeling of exploitation and alienation have resulted in violence and diverse demands by various Indian Insurgent Groups (IIGs). The demands vary from sovereignty in some cases to independent State or Homeland or simply better conditions for ethnic groups they claim to represent.

III. ATREE's previous interventions

ATREE EH has accumulated twenty years of experience in knowledge generation, regional capacity development, and sustainable livelihoods promotion in the Sikkim Himalayas and North Bengal. We also have a long-term record of engagement with conservation planning and management in neighboring Assam. This history underpins ATREE's strategy for addressing critical needs in knowledge generation and outreach for the entire NE region.

Through coordinating the CEPF small grants program for the NE region, ATREE has been able to forge a network consisting of more than 20 organizations and 30 individual researchers working toward the common goal of sustainable development. Building solidarity and cooperation in the region is vital to scaling up our successes. In particular, continued engagement with policy makers and administrative agencies, as well as with NGOs, researchers and academicians, is an indispensable step for making progress on all our environmental challenges. ATREE is playing an important role in regional forums like the Integrated Mountain Initiative—a coalition of institutions and individuals formed in 2011 to redefine the architecture of sustainable development across the 12 mountain states of the Indian Himalayas and Northeast India. .

IV. Strategy and Operational Framework (2016-2026)

1. ATREE EH/NE Initiative Vision: To help the region of Eastern Himalayas/Northeast India develop multi-functional landscapes where biodiversity is protected, ecosystem integrity maintained and the well-being of its people promoted.

2. ATREE EH/NE Initiative Goals: The broad goals of ATREE's Eastern Himalaya/NE Initiative are

- a) Assess and monitor regional **biodiversity and ecosystem services**;
- b) Support the development of sustainable **landscape management systems** by understanding the complex relationships among regional economic activity, forest resources, agriculture and **climate change**.
- c) Enhance the regional **science-policy interface** by bringing stakeholders together to strengthen governance and institutions for coping with environmental change, including climate-induced disaster risk; and
- d) Build regional **human capacity** to meet the challenges of environmental change.
- e) Strengthen existing **knowledge and action networks among** civil society organizations, government agencies, and local communities to build resilience to environmental change.

3. ATREE EH/NE Initiative Thematic areas of intervention (*What and where to engage*)

Following are some of the salient and relevant themes that ATREE needs to engage in over the next 5 years in the region. Fellows and other researchers will independently develop detailed research questions and research frameworks based on these broad themes.

3.1. Programmatic Themes

- a) **Biodiversity and Ecosystem Services:** Actions under this theme will include generating information and knowledge of key ecosystem processes and their interactions with local communities . The ecosystems include forests, grasslands, wetlands, rivers, and springs. Many of these systems are important biodiversity repositories containing species under threat due to anthropogenic pressures, and many need documentation to undergird recovery and restoration plans. This theme area would also include biodiversity assessments, the establishment and maintenance of long-term sites for monitoring ecosystems, livelihoods, biodiversity and climate change.
- b) **Climate change:** Through this theme we aim to understand how climate change, in combination with land use land cover change (LULCC), is impacting biodiversity, hydrology and livelihoods in EH/NE India. This will include interdisciplinary research to generate information on livelihood impacts and local mitigation/adaptation measures in communities affected by climate change. Since climate-related disaster risk is pertinent in the mountains, this thematic group will also include engagement in understanding Disaster Risk Reduction linkages with current regional development pathways, and research on alternative ('climate smart') pathways.
- c) **Water:** This theme includes attention to rivers, spring-sheds, wetlands and water bodies, and their relationships to biodiversity and human wellbeing. Threats to rivers and forests with the commissioning of Hydropower plants are relevant in EH/NE India. A priority of this theme is to understand the impacts of hydropower projects (both large and small) on ecological services, associated biodiversity and aquatic ecosystems upstream and downstream. Mountain springs, streams and spring-sheds are vital for the well-being of communities living in the hills. These water sources are closely related to agriculture and to rural and urban water availability, and are most threatened natural spaces. Key foci of intervention in this thematic group are

documentation, monitoring and understanding the management and governance of these resources, as well as conflicts around them.

- d) **Ecosystem services and resilience:** The ecosystems of EH/NE region support human communities in the forest-agriculture landscapes who are directly dependent for their livelihoods on forests (non-timber forest products, livestock fodder, energy, subsidies to agriculture), fresh water, and ecosystem services such as pollination and micro-climate regulation. These areas also receive disservices such as crop raiding by wildlife. These multifunctional landscapes are crucial to the well-being of a significant proportion of the population. However, global-scale changes like climate change and market penetration—as well as local changes brought about by development, demographic change, land-use and land-cover change, etc.—are impacting these landscapes. Research is needed to understand these complex and dynamic landscapes, their drivers of change, and possible pathways to resilience in the face of change. Ways that market forces and economic drivers are affecting use of biodiversity and other ecosystem services (ES) are a key research focus.
- e) **Agriculture in forest-agriculture interfaces and Tea:** Agriculture and tea remain the principal rural livelihood strategies in the EH/NE. However, changes in farming patterns in response to market pressures—including increased use of synthetic fertilisers and pesticides, conversion of multi-cropping land to commercial monoculture plantations, and shortened cycles of shifting agriculture—compounded by impacts of changing weather patterns, are already having on biodiversity and ecosystem function, hence on the livelihoods of farmers. Similarly, climate change is having an impact on tea quality and quantity. This theme addresses the development of sustainable agro-ecosystems including tea, in partnership with local communities, government agencies, and trade associations for tea. Another focus of this theme is an understanding of the consequences for ecosystem function and ES of a region-wide transition from shifting agriculture to cash-crop plantations, with a focus on soils, hydrology, food security and bio-mass based livelihoods.

3.2. Crosscutting Themes

- a) Governance and institutions pertaining to management of natural resources (including traditional systems in 6 of the NE states)
- b) Livelihoods to enhance human/community well-being, as well as ecosystem resilience

- c) Capacity-building (academics, outreach, training, fellowships, small grants)
- d) Policy engagements for inputs to policies and legislation at local, state, regional and national levels.

4. ATREE EH/NE Initiative Strategies (*How to engage*)

Research and development will be coupled with education and outreach programmes to build capacities of local researchers in monitoring and mapping biodiversity, understanding the dynamics of ecosystem services and associated livelihoods, and establishing the scientific basis for sustainable use.

- a) **Knowledge generation:** ATREE aims to develop programmes in NE India that advance knowledge of regional biodiversity and ES, their responses to current and future climate change, scientific and technological innovations, and the sustainable use of bio-resources. Salient knowledge will be generated through rigorous, interdisciplinary, long-term research programmes and sub-projects measuring and monitoring biodiversity, ecosystem functions and ES of forests, wetlands, forest-agriculture ecotones, and urban landscapes.
- b) **Policy engagements:** Working with policy influence groups and forums, organizing policy dialogues directly with administrative agencies, policy reports series.
- c) **Field level implementation:** Livelihoods related to developing resilience, conserving biodiversity by lowering threats of over-exploitation, community and human well-being, ecosystem services and ecosystem based management of natural resources, preparedness for climate change risks
- d) **Dissemination of knowledge and information:** Research and development will be coupled with education and outreach programmes to build capacities of local researchers in monitoring and mapping of biodiversity, understand the dynamics of ecosystem services and associated livelihoods, and establish the scientific basis of sustainable use. We are promoting innovations in open access online Internet based systems like IBP; more workshops, interactions and knowledge sharing; and a clearinghouse mechanism for scientific information generated in the region.
- e) **Networks and Capacity building:** Reaching out to multiple stakeholders for various kinds of training relevant to the work we are doing and the achievements we are pursuing in the region. Dedicated scholarships and training programmes for scholars and students from the NE. Sustaining networks of activists and conservationists through partnerships and exposure workshops.

5. ATREE EH/NE Initiative Outputs (2016-2026):

The general outcome ATREE seeks is the enhanced capacity of the society to manage environmental change, protect natural assets to ensure sustainable flow of ecosystem services, and to reduce the vulnerability of local communities to environmental disasters. The three elements for meeting these outcomes are:

- a) Develop two centers for knowledge generation and sustainable management of natural resources in collaboration with like minded organizations, one in Sikkim- Darjeeling Himalaya , and another in Assam. The centers will demonstrate the concept of multifunctional sustainable landscapes, based on multi-year research and field implementation.
- b) Set up a NE/EH 'science-policy interaction forum' to bring the scientific community together with policy makers, practitioners, private sector, advocacy groups, young people and other networks to collectively explore ways to address regional challenges
- c) Train a critical mass of people (particularly young) in sustainability science to address critical environmental challenges in NE/EH regional sustainability
- d) Create knowledge networks consisting of non-government organizations , academic institutions, private sector, and government institutions

6. ATREE EH/NE Initiative Overall Outcome

Sustainable multifunctional landscapes, economically and socially empowered local communities, resilient institutions, and human resources capable of meeting environmental challenges

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